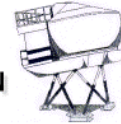




AFS-205 FEDERAL AVIATION ADMINISTRATION NATIONAL SIMULATOR PROGRAM



Simulator Implementation Procedures Working Plan Phase I – Authority System Familiarization

A. The FAA System. (Par. 4.1 of the SIP Working Plan)

Paragraph 4.1 of the Simulator Implementation Procedures Work Plan calls for the FAA to familiarize the JAA with its system of simulator evaluation/qualification, including the associated documents, and to identify “those principles that are similar and those that are different in the accomplishment of simulator evaluations and the criteria necessary for qualification or denial of qualification status.”

Statutory basis. The FAA’s legal authority derives from federal statute, formerly known as the Federal Aviation Act, but now contained in Title 49, United States Codes, VIIA; the chapters relevant to the SIP are Chapter 447, Sections 44703, 44709, 44710, 44711; Chapter 451; Chapter 461; and Chapter 463. In these provisions, Congress has directed the agency, among other actions, to issue regulations providing for the certification of airmen, setting standards for their certification, issuing operational regulations, and taking enforcement action as necessary against airmen who fail to comply with the regulations.

Regulations. The regulations issued by the FAA are the Federal Aviation Regulations, which are cited as 14 Code of Federal Regulations (C.F.R.) parts 1 through 199. The principal regulations that are pertinent to the SIP are contained in parts 1 (Definitions), 13 (Investigative and Enforcement Procedures), 61 (Certification: Pilots, flight instructors, and ground instructors), 91 (General operating and flight rules), 121 (Operating requirements: Domestic, flag, and supplemental operations), 135 (Operating requirements: Commuter and on demand operations and rules governing persons on board such aircraft), 141 (Schools and other certificated agencies) and 142 (Training centers). Proposed regulations and final regulations are published in the Federal Register, a federal publication that appears regularly and is distributed to the public.

The FAA is in the process of issuing part 60 to incorporate simulator standards currently set forth in an Advisory Circular, as discussed below. The new rule will also replace the provisions currently contained in 14 C.F.R. part 121 Appendix H concerning standards for simulators used in flightcrew training.

FAA Advisory Circulars. The standards for airplane simulator evaluation and qualification are currently contained in an Advisory Circular (AC), rather than in the FAR, although the FAA is in the process of revising the FAR to make those standards regulatory, for the sake of consistency. Advisory Circulars contain information helpful to the public in complying with the FAR, in this case, with the rules applicable to pilot certification and simulator qualification. Advisory Circulars are listed in AC 00-2, Advisory Circular Checklist, which is accessible to the public through the internet as well as in hard copy. AC 00-2 also provides the status of FAA internal publications. The FAA publishes notices of new AC’s and revisions to AC’s in the Federal Register.

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AC 120-40B, Airplane Simulator Qualification, is the reference currently used by the FAA to determine whether a simulator can be used by pilots in meeting their certification and currency requirements. As noted above, the FAA plans to replace the AC with a new rule and associated QPS (Qualification Performance Standards) document. In the meantime, the AC remains in effect and applicants for simulator qualification can choose to meet its standards. Alternatively, an applicant may choose to comply with the Flight Simulation Device Guidance Bulletin (FSDQG) 03-12 or FSDQG 03-09. FSDQG 03-12 serves to clarify and confirm the acceptance by the FAA of the standards and procedures contained in Draft AC 120-40C, Airplane Simulator Qualifications, both for simulator qualifications already performed in accordance with the Draft AC and for future qualifications, until new regulations take effect. The Draft AC 120-40C contains the standards in the First Edition of the ICAO Manual of Criteria for the Qualification of Flight Simulators (Doc 9625-AN/938), which consists of all the same standards as those in 40B *plus* additional standards. With the publication of the Second Edition of the ICAO Manual of Criteria for the Qualification of Flight Simulators, the FAA published FSDQG 03-09 to serve as an additional alternate means of qualification of airplane simulators pending the effective date of the proposed Part 60.

FAA Orders. Orders are internal FAA documents, although they are available to the public. They contain information on FAA procedures and standards for the purposes of FAA implementation by inspectors, FAA designees, and agency employees in general. They are obligatory for those persons. Orders such as 8400.10, Air Transportation Operations Inspector's Handbook, contain direction for air carrier inspectors on integration of simulators into an operator's training program and the approvals required. The same is true of Order 8700.1, General Aviation Operations Inspector's Handbook, which is used by inspectors who work with part 142 Training Centers. Order 8710.3C, Pilot Examiner's Handbook, contains comparable material, and walks the FAA designee pilot examiners through the pilot certification process and the appropriate use of simulators.

The National Simulator Program Office procedures are in the process of being recorded in an Office Policy Manual; Chapters 6 and 7 are complete and contain information regarding Evaluation Scheduling and the administrative procedures for evaluations.

Other materials. The FAA also utilizes a reference document published in two volumes by the Royal Aeronautical Society in conducting simulator evaluations. This document, the "Simulator Evaluation Handbook," which is also used by the JAA, was compiled by the RAeS with the assistance of the FAA and other members of the international flight simulation community, including JAA member states (JAR STD-1A also makes reference to this document). Volume I of the Handbook contains discussion of the methodologies used to evaluate simulators, including the use of automatic and manual tests, evaluation of computer-controlled aircraft, presentation of test results, and the requirements of a configuration control system (CCS) to be established by the simulator operator. Volume II describes subjective and functions testing methods. The Handbooks are primarily utilized by those conducting simulator evaluations, but are recommended to applicants for use in developing their Qualification Test Guides.

Enforcement. Order 2150.3A, Compliance and Enforcement Program, contains information for FAA inspectors and attorneys conducting investigations under FAR part 13 of possible non-compliance with the FAR and bringing enforcement actions against

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pilots and other FAA-certificated persons and entities. It advises the FAA employees of the rights of the individuals, gives sanction guidelines, and the like. Simulators are not certificated, and while enforcement action related to a simulator is possible (though rare), such action would be against the carrier using the simulator rather than the simulator owner/operator.

FAA materials, including AC 120-40B, are available on its web site.

Quality Assurance Program. As discussed in greater detail below, the FAA is in the process of amending its rules to require that simulator operators develop and obtain FAA approval of a quality assurance (QA) program. In the interim, until the rule is effective, the FAA has been encouraging simulator operators to voluntarily establish QA programs and obtain FAA review of them; information regarding the “Simulator Quality Assurance Program 2000” (SQAP 2000) is published on the NSP’s website. Each program provides for the operator to designate a management representative (MR) who will have the responsibility to oversee and/or participate in the development and implementation of procedures for tracking the simulators, including logging discrepancies and corrective actions, recording of NSP and operator-conducted evaluations, documentation of software and hardware modifications, maintenance, and changes to aircraft configuration, and so forth. The principal goal of the QA system is assurance that the simulator is at its highest level of capability each time it is used for a qualified purpose. The operator assesses its quality program on at least an annual basis and provides the result of that assessment to the NSP, which verifies the effectiveness of the program by tracking the simulator from one evaluation to the next.

The FAA’s Simulator Program and Its Staff

The National Simulator Program (NSP) maintains the technical expertise and standardization necessary for aircraft simulator and flight training device evaluation, and performs evaluations of simulators and flight training devices. The NSP is part of the FAA’s Flight Standards Service, and it is located in Atlanta, Georgia. The NSP staff consists of 32 persons, including 20 pilot evaluators and 6 engineers (an organizational chart is attached to this document as an attachment). The NSP reports directly to the Manager, Air Transportation Division, AFS-200, a division of the Flight Standards Service at Washington Headquarters.

FAA initial simulator evaluations are conducted by a team composed of a pilot and an aeronautical engineer. The inspector pilots (also called National Simulator Specialists) currently on the NSP staff have an average flight time experience of well over 10,000 flight hours. They are required to hold a type rating on one or more modern turbojet/turbo propeller airplanes and/or rotorcraft. Engineers who are hired by the NSP must have at least a bachelor’s degree in aerospace engineering or engineering technology and at least one year’s professional engineering experience, with an in-depth technical knowledge of aircraft systems including knowledge of state-of-the-art aircraft flight simulation device systems (their design, testing, and computer programming).

The Initial Evaluation Process

As described in the NSP Office Policy Manual, an operator proposing to include an airplane simulator in a training program must first submit a letter of request to its

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Principal Operations Inspector (POI) or Training Center Program Manager (TCPM), as appropriate. The letter describes the training equipment and its proposed use in the training program. Operators may also request a date for initial evaluation prior to submitting the Qualification Test Guide (QTG, formerly the Airplane Test Guide, or ATG), discussed below. A convertible simulator is evaluated separately for each model and series to which it may be converted and for which FAA qualification is sought.

If an operator wishes to receive specific flight training credit, or to administer flight evaluations under FAR parts 61, 63, 121, 125, 135, 142, or an Advanced Qualification Program (AQP), the letter of request must be accompanied by a QTG which meets the standards described in Advisory Circular (AC) 120-40B, as amended, for airplane simulators. In this connection, only manufacturer's flight test data will be accepted for simulators for aircraft type certificated after June 1980 or with supplemental type certificates based on modifications which would affect handling or performance and which have been issued after that date. Requests for exceptions (that is, alternate sources of data) will be reviewed by the NSP Manager. Exceptions would include situations where only engineering simulation data are available; actual flight test data are preferred, wherever possible, but the FAA recognizes that occasionally situations occur when such data may not be available.

If the operator wishes to receive training and/or checking benefits with an advanced (Level C or D) simulator, it must submit an Advanced Simulation Training Program as prescribed in FAR part 121, Appendix H.

The POI or TCPM reviews the operator's request and QTG, and then forwards these documents to the NSPM, requesting a technical evaluation of the QTG and designating an FAA point of contact (the POI or TCPM) for coordinating a formal evaluation of the training equipment.

The NSP staff reviews the QTG to determine that it meets the minimum standards described in AC 120-40B, for airplane simulators, with reference to the guidance contained in the RAeS Evaluation Handbook. The NSP staff notifies the operator of any discrepancies discovered during the QTG evaluation, and resolves them with the operator. Within ten working days of finding a QTG acceptable, the NSPM will coordinate with the operator and the POI/TCPM to establish a mutually acceptable date for an on-site evaluation of the simulator/flight training device.

The NSPM then assigns the evaluation to a National Simulator Specialist who will be the team leader for the evaluation. For an initial evaluation, the team generally consists of an NSP specialist (pilot inspector) and an engineer. If difficult technical issues arise during an evaluation, the team leader may request the assistance of an FAA flight test pilot from an Aircraft Certification Office. The operator must provide a qualified pilot to participate in the evaluation.

Normally, during the technical review of the QTG, the NSP engineer completing the review utilizes a comprehensive list of tests to design the Evaluation Checklist to be used on a specific evaluation. Not all tests on the list are performed; rather, a selection is made which is sufficient to ensure assessment in areas essential to the airman training and checking process.

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The FAA's approach is described in detail in Paragraph 8 of AC 120-40B. In brief, both objective and subjective tests are performed on the simulator. Subjective tests include handling qualities, performance, and simulator systems operation. Objective tests include determining that the simulator itself meets the minimum standards prescribed for its particular evaluation Level, and validation tests (comparing the results obtained in the simulator to airplane performance data). In evaluating validation results and applying engineering judgment to deviations, reference may be made to the evaluation guidance contained in the RAeS Evaluation Handbook mentioned previously.

On the day of an initial evaluation, the NSP team leader conducts an "in-briefing" for the simulator sponsor and manufacturer representatives, reviewing the responsibilities of the team members and other participants and the evaluation agenda for the day. An out-briefing is held at the completion of each day, to review any discrepancies discovered during the evaluation.

During performance testing, one team member is in the cockpit, working with and assisting the pilot flying the test procedures. That team member will also manually fly a representative number of tests using the manual test procedures. Another team member will monitor the test results as they are processed, and evaluate the results. The team leader must use his or her individual experienced judgment to a considerable extent in evaluating the simulator's output when that output falls outside tolerances throughout an entire time history dynamic check. It is not uncommon for the team leader to be required to render a subjective opinion in an equivocal area. In such instances, the rationale is documented in the test results and on the evaluation checklist as a discrepancy, with an indication of correction.

Upon completion of the evaluation, the team will make a determination regarding qualification of the simulator. The team may decide to qualify the simulator at a specific level, with final approval pending NSPM review of the master QTG prior to the first recurrent evaluation. Simulator discrepancies, if any, are recorded, along with specific corrective actions to be taken, and (if applicable) interim training restrictions established. Alternatively, the team may qualify the simulator to a level lower than that applied for by the operator. Finally, the team may determine that qualification is not appropriate at that time. The results of the evaluation are coordinated with the operator's POI/TCPM, to assure a consensus.

Recurrent evaluations

The FAA now performs recurrent evaluations of simulators on an annual basis. The recurrent evaluation is performed by an NSP Specialist, usually with the assistance of the POI or TCPM. Operators are required to provide for at least 8 hours for the first (and possibly subsequent) recurrent evaluations.

The recurrent evaluation is effectively designed at the time of the pre-briefing meeting between the FAA and the operator, including the operator's pilot. The FAA reviews the maintenance log to assure timely maintenance has been performed, and evaluates tests accomplished by the operator since the last evaluation (AC 120-40B does not address

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self-evaluation tests in detail but they have become standard practice for simulator operators and the upcoming rules and associated material will specifically address the matter.) At his/her discretion, the evaluator will select approximately 8 to 15 objective tests from the MQTG that will, in the opinion of the evaluator, provide an adequate opportunity to evaluate, first hand, the performance of the simulator. The tests chosen will be performed either automatically or manually, at the discretion of the evaluator and should be able to be conducted within no more than approximately one-third (1/3) of the allotted simulator time. Additionally, the evaluator will subjectively evaluate a sampling of the tasks described in the Functions and Subjective tests appendix, which will be selected at the discretion of the evaluator. The number of tasks selected and the sequence of their evaluation will result in this portion of the evaluation taking no more than the remaining balance (approximately two-thirds, 2/3) of the overall allotted simulator time.

Attachments:

1. [Proposed changes to Part 60 of the Federal Aviation Regulations](#)
2. AC 120-40B Vs JAR STD 1A Amendment 2 Comparison Charts
3. FAA National Simulator Program FY 2003 Organizational Chart

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Submitted By: _____ :

FEDERAL AVIATION ADMINISTRATION
DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

By: Edward D. Cook

Title: National Simulator Program Manager

Date _____

Reviewed By:

NAA

By:

Title:

Date _____

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Attachment 1: Proposed Changes to Part 60 of the FAR

As noted in the body of this document, the FAA is in the process of amending its rules to consolidate and incorporate the simulator standards into the regulations from their current locations in various parts of the FAR as well as in Advisory Circular 120-40B. As of January 2004, rule making is still in process, and the FAA anticipates that it may be approximately two years before the new rules become effective. Nonetheless, the FAA believes it is important for purposes of the SIP discussions to clarify the extent to which the new rules are likely to affect the FAA's current procedures. What follows is a brief summary.

The proposed rules will not only codify the FAA's simulator standards, but will also update its requirements to a certain extent. Currently, Appendix H of part 121 contains provisions regarding use of simulators by air carriers; through the exemption process, these provisions are also available to operators under parts 125 and 135. In addition, part 142, Certification of Training Centers, contains procedures and requirements for facilities whose sole function is training and testing, not operating under any of the passenger-carrying rules. The new rule will excise the technical requirements in part 121 and relocate them into a new part 60, titled "Flight Simulation Device Qualification." The proposed new part 60 would establish flight simulation device (FSD) requirements that could be used by anyone who conducts flightcrew member training, evaluation, and provides flight experience required by any of the Federal Aviation Regulations.

The FAA intends that Part 60 would also contain items (such as frequency, content, and method of evaluation) where the test, the test conditions, and the test tolerances are similar if not identical to those tests, test conditions, and test tolerances currently found in the Second Edition of the ICAO manual 9625 for Level D simulators, as well as the standards in JAR-STD 1A Amendment 3. Standards and specific items that are subject to change as a result of technological advancements and analysis of accident and incident investigation would be placed into Qualification Performance Standards (QPS) documents which could be amended without requiring the extensiveness of the complete rulemaking process without compromising the ability of the public to see and comment on the proposed changes prior to their being adopted and published.

The FAA was a principal contributor to the international project which produced in the early 1990s a new set of recommended simulator criteria and standards, which were subsequently adopted by ICAO in its Manual of Criteria for evaluation and qualification of the highest two levels. This Manual has recently been revised, with FAA input, and the second edition contains standards only for Level D simulators. These standards are essentially consistent with those in AC 120-40B but contain additional tests and associated required tolerances. The FAA's supplemental proposed rule reflects the new Manual standards.

The new rule will also contain updated terminology reflecting current practice. Specifically, the term 'sponsor' is now used by the NSP to refer to an individual or entity, including a certificate

holder, seeking qualification and subsequent approval for use of the simulator in a specific training program. The sponsor agrees to assume responsibility for maintaining

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the simulator according to prescribed standards. The sponsor may contract with another person for services of document preparation and presentation, as well as simulator inspection, maintenance, repair, servicing, etc., but the sponsor retains ultimate responsibility for the qualification of the simulator. Other certificate holders may seek approval to use the same simulator for credit under an approved training program, but such certificate holders would not be sponsors of the simulator. Such arrangements are currently permitted under AC 120-40B; the only difference is that under 40B both the entity responsible for the simulator qualification and the entity who relies on that qualification to obtain approval for simulator use in its training program are both called “operators.”

The term “Master Qualification Test Guide” (MQTG) is also used in the rule although it is not the term used in the currently effective AC 120-40B. The MQTG is FAA-approved Qualification Test Guide with the addition of the FAA-witnessed test, performance, or demonstration results, applicable to each individual simulator.

For a copy of the changes to Part 60 visit the NSP website at http://www.faa.gov/nsp/part60_FTD.htm.

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Attachment 2. Comparison Charts

The following comparison charts were reviewed by the FAA, UKCAA, and Swiss FOCA to identify difference between AC 120-40B and JAR STD 1A, Amendment 2. These differences were used as a reference in determining the special conditions listed in the Simulator Implementation Procedures. It was decided by all parties that AC 120-40B was the most divergent document and therefore, there was not a need to complete additional comparisons of Draft AC 120-40C and JAR STD 1A, Amendment 3 at this time.

Chart 1 - FAA/JAA COMPARISON OF EVALUATION PROCEDURES

**Chart 2 - COMPARISON OF FAA AND JAA GENERAL SIMULATOR
REQUIREMENTS FOR SIMULATORS QUALIFIED UNDER AC 120-40B
(1991) AND JAR-STD 1A AMENDMENT 2**

**Chart 3 - COMPARISON OF FAA AND JAA SUBJECTIVE SIMULATOR
TESTS FOR SIMULATORS QUALIFIED UNDER DRAFT AC 120-40B
(1991) AND JAR-STD 1A AMENDMENT 2**

**Chart 4 COMPARISON OF FAA AND JAA OBJECTIVE TESTS FOR
SIMULATORS QUALIFIED UNDER AC 120-40B (1991) AND JAR-STD
1A AMENDMENT 2**

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CHART 1

FAA/JAA COMPARISON OF EVALUATION PROCEDURES

FAA	JAA	Special Condition
INITIAL EVALUATION	INITIAL EVALUATION	
<p>Evaluation team: per Office Policy Manual, Chapter 7</p> <p>Initial:</p> <ul style="list-style-type: none"> - NSP Specialist (pilot inspector) - Aerospace engineer and (optional) addition of a flight test pilot <p>Operator must provide a qualified pilot to participate in the evaluation</p>	<p>ACJ No. 1 to JAR-STD 1A.015 par.2</p> <p>--Technical Flight Simulator Inspector from NAA <i>or</i> another NAA (this is an engineer);</p> <p>and either</p> <p>-- #1 [Most commonly used]: Flight inspector qualified in flight crew training procedures, from NAA <i>or</i> another NAA; must have a type rating</p> <p>or</p> <p>--#2 Flight inspector of the Authority qualified in flight crew training procedures assisted by a Type Rating Instructor who is type rated on the aircraft; or “exceptionally,”</p> <p>-- #3 [Very uncommon] An NAA designee qualified in flight crew training procedures and type rated on the aircraft. Per a note to par. 2.1(b)(iii), if a designee is used the other person MUST be a properly qualified inspector, that is, must be type rated</p> <p>In addition, the operator or “main simulator users” should have provided a type rated Training Captain, and “sufficient support staff to assist in running of tests and operation of the instructor’s station.”“</p> <p>At 7/22-25/03 meeting in Washington, FAA, UK CAA, and FOCA agreed that for purposes of their SIPs, these teams were equivalent.</p>	NONE
Length of initial evaluation: See NSP website and Office Policy Manual; practice is to require 3 days	ACJ 2 TO JAR-STD 1A.015(b) 2.3.1 Three days for initial evaluation	NONE
Type of testing:	ACJ 1 5o 1A.030 p	NONE

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FAA	JAA	Special Condition
INITIAL EVALUATION	INITIAL EVALUATION	
<p>AC 120-40B, par. 8(c), and 120-40C: objective (validation), subjective, and functions tests, from Appendixes 2 and 3 of the AC</p> <p>Subjective: Office Manual, par.4.f: ground and in-flight evaluation of all systems, including normal and abnormal operation; evaluation of the visual system utilizing the evaluation checklist and appropriate AC; evaluation of the motion system utilizing the evaluation checklist and appropriate AC; check system failures at instructor operating station.</p>	<p>par. 3.1.2 says that the purpose of functions and subjective tests is to ‘confirm that the simulation has produced a totally integrated and acceptable replication of the aeroplane.’ Says it should ‘cover those areas of the flight envelope which may reasonably be reached by a trainee, even though the simulator has not been approved for training in that area.’ Includes examination of ‘normal and abnormal simulator performance to ensure that the simulation is representative even though it may not be a requirement for the level of Approval being sought.’”</p> <p>NAA may also use the “LST” (Licenses Skill Test) as a tool for evaluation.</p> <p>Parties at July ’03 meeting in Washington agreed no difference</p>	
<p>Treatment of discrepancies:</p> <p>AC 120-40B , par.8(g): In the event a validation test(s) does not meet specified criteria, but the criteria is not considered critical to the level of validation being conducted, the NSPM may conditionally qualify the simulator at that level. The operator will be given a specified period of time to correct the problem and submit the [ATG] QTG changes to the NSPM for evaluation.if the results of a validation test could have a detrimental effect on the level of qualification being sought or is a firm regulatory requirement, the NSPM may qualify the simulator to a lesser level or restrict maneuvers based on the evaluation completed.</p> <p>Procedures on NSP website: non-data discrepancies, operator has 30 days to correct; data discrepancies, 6 months. Extensions permitted.</p>	<p>ACJ No.2 to STD 1A.015</p> <p>.1.2 “Generally these defects [identified in the evaluation] should be rectified and the Authority notified of such action within 30 days.</p> <p>Serious defects, affecting crew training, testing and checking, could result in an immediate downgrading of the Qualification Level, or if any defect remains unattended without good reason for a period greater than 30 days, subsequent downgrading may occur.</p> <p>ΔComparable, except that the authorities may treat the results of discrepancies differently: that is, while both authorities require the operator to correct the problems, the FAA must review the associated QTG changes while the NAA simply requires notification of correction; but this is case by case, and NAA may sometimes specifically confirm a correction. July ’03 DC meeting : parties agreed no difference</p>	NONE
<p>Simulators which have been moved:</p> <p>AC 120-40B, par.8(g): operator must advise the POI/TCPM and NSP of the move; and prior to returning it to service, perform typical recurrent validation and functions tests.</p>	<p>JAR–STD 1A.040 Changes to qualified Flight Simulators</p> <p>1A.040(c) similar language, requires 1/3 of the validation tests and functions & subjective tests; at NAA’s discretion to come in and check</p> <p>FAA considers NAA approach equivalent, no need for SC.</p>	NONE

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RECURRENT EVALUATION –FAA	RECURRENT EVALUATION – JAA	SPECIAL CONDITION
<p><i>Note, these procedures are those in current usage by the simulator office, and may supersede AC 120-40B</i></p> <p>First recurrent: 6 months after initial evaluation</p> <p>Thereafter, recurrences are scheduled annually In scheduling recurrences, the FAA permits the evaluation date to be any time during the month preceding the date of the previous evaluation's anniversary, or any time during the month after. The evaluation will be considered to have occurred in the month in which it was due.</p>	<p>1A.020(a) An STD qualification is valid for 12 months unless otherwise specified by the Authority;</p> <p>Δ FAA requires first recurrent 6 months after initial, annual thereafter; JAA permits first recurrent to be 12 months after initial. FAA will require a special condition.</p> <p>(b) [Revalidation test] may take place at any time within the 60 days prior to the expiry of the validity of the Qualification document. The new period of validity shall continue from the expiry date of the previous Qualification document.</p> <p>Δ Another disjunction here despite similar cycles: For example: if, on May 5, 2001 FAA performed a recurrent on a simulator previously evaluated on April 5, 2000, this would be outside the JAA's limits; but both parties do have discretion for extensions. FAA, UK CAA, and FOCA are aware of this and agreed at the July 2003 meeting to work to align their schedules so that significant disjunctions do not occur.</p>	<p>(a): NONE</p> <p>(b): NONE</p>

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RECURRENT EVALUATION –FAA	RECURRENT EVALUATION – JAA	SPECIAL CONDITION
<p>Length of evaluation: Current practice: four hours for most simulators except for exceptionally complicated aircraft which may take up to 6 hours.</p>	<p>ACJ No.2 to STD 1A.015(b) 3.1.2: For a modern simulator incorporating an automatic test system, four hours [for objective testing] would normally be required. Simulators which rely on manual testing may require a longer period of time. 3.2.2 Time for subjective testing “normally” is “about 4 hours.” <i>total: 8 hours when there’s an automatic test system</i> Δ Authorities may require additional time to accomplish special conditions.</p>	<p>UK CAA/FOCA AND FAA SPECIAL CONDITION: : FAA and NAA will schedule additional time, if necessary, to accomplish the NAA/FAA Special Conditions.</p> <p>An additional 2 hours should be scheduled to allow for the additional regulatory review to take place. (difference between initial and recurrent?)</p> <p><u>Note</u>, on some older simulators, reconfiguring between the US and European standard may take some time. If significant, this time should be built into any schedule.</p>
<p>Test for recurrences: Under current practice (“Sponsor-conducted Quarterly Checks”), the operator performs quarterly checks of at least 1/4 of the tests in the QTG. Thus, by the end of the year, all of the QTG tests have been completed. The recurrent evaluation then does a sampling of tests, just as JAA requires in ACJ NO. 2 TO 1A.015(b) 3.1 and 3.2.</p>	<p>ACJ No. 2 to STD 1A.015(b) 3.1: Objective testing: 3.1.1 NAA will ‘want to see evidence of the successful running of the QTG between evaluations.’ NAA will select a number of tests to be run during evaluation, including those which may be cause for concern...” 3.2 Subjective testing: 3.2.1: Calls for the same subjective testing as for the initial evaluation, as laid out in par. 4.6 Δ FAA and UK CAA and FOCA agreed no significant difference here, no need for special condition. (JAA calls out progressive testing through the QA system.)</p>	<p>NONE</p>

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RECURRENT EVALUATION –FAA	RECURRENT EVALUATION – JAA	SPECIAL CONDITION
<p>40B par. 12 modification of simulators, motion systems & visual systems</p> <p>(a) Operator must notify POI and NSPM at least 21 days in advance, of any hardware/software changes which ‘might impact flight or ground dynamics of a simulator’; must provide a complete list of the planned changes and update to the MTQG.</p>	<p>1A.040 Changes to Qualified Flight Simulators</p> <p>(a) Operator must notify the Authority of proposed “major changes such as:”</p> <ul style="list-style-type: none"> (1) Aeroplane modifications which could affect qualification (2) Hardware and/or software mods which could affect handling qualities, performances, or system representations <p>UK CAA pointed out that 1A.015 requires 3 months notice for all requested evaluations/1 month in exceptional circumstances; 30 days is what they require for these types of evaluations. Authorities agreed no significant difference</p>	<p>NONE</p>

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RECURRENT EVALUATION –FAA	RECURRENT EVALUATION – JAA	SPECIAL CONDITION
<p>40B par. 9(g): (re: movement of simulators): must advise POI and NSPM; must perform “ typical recurrent validation and functions tests”; results to be available for inspection by FAA at next evaluation; NSPM has discretion to require an evaluation before return to service and as a matter of practice it always does.</p> <p>Movement of a simulator qualified under the SIP back into the U.S. from an NAA country: FAA considers approvals based on the SIP to be ineffective if the simulator returns to the United States, and will require re-qualification. FAA will need to ensure its guidance material makes this clear to the simulator owners/operators.</p> <p>40B par.10(f) removal from service for “prolonged periods” requires notice and evaluation for possible update of the qualification basis will be performed by NSPM prior to return to service</p>	<p>1A.040 Changes to Qualified Simulators, cont’d</p> <p>(a) (3) Relocation of the flight simulator; must advise authority in advance; must perform at least 1/3 of validation tests and functions and subjective tests prior to returning to service ΔFAA uses a form for this; the operator must run all the tests, keep the results on site, and provide a company compliance letter; there is an 8-hour evaluation performed with just the Aviation Safety Inspector. This re-evaluation is discretionary for the JAA, and while supposedly discretionary for FAA, it nearly always requires it. FAA agreed no SC required.</p> <p>Same. Authorities agreed to revise SIP paragraph 2.1 to clarify this point.</p> <p>(a) (4) Any deactivation of the flight simulator Notification is required, but procedure for return to active status is not specified here. Δ NSP requires evaluation, JAA is not specific. No special condition required.</p>	<p>NONE</p>

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UPGRADE EVALUATION – FAA	UPGRADE EVALUATION - JAA	SPECIAL CONDITION
40B Par. 9 Initial or upgrade evaluations.	Upgrade of a flight simulator: simulators may be upgraded to a higher qualification level. “Special evaluation is required” if the upgrade evaluation doesn’t fall on the anniversary of the original qualification date. Authorities agreed no need for special condition.	NONE
Evaluation methods: RAeS handbook vol. II	AMC no. 1 to JAR-STD 1A.030 1.2.2 Same	NONE

OTHER DIFFERENCES	JAA	SPECIAL CONDITION
Quality System: FAA currently recommends that simulator operators adopt a quality system in accordance with standards published on its website. Future rulemaking will make this mandatory but in the meantime an NAA SC will be required.	JAR-STD 1A.025 requires a quality system for all simulators. During JAA evaluations, simulator metrics regarding availability, reliability such as described in Arinc 433 are typically assessed.	UK CAA/FOCA AND FAA SPECIAL CONDITION: NAA will require a Quality System to be in place in accordance with JAR STD requirements. Quality system and process was discussed during the JAA steering Group meeting in March 2004, with FAA in attendance and is ongoing.

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OTHER DIFFERENCES	JAA	SPECIAL CONDITION
<p>Health and Safety requirements: FAA checks for escape ladders, does not require a Occupational Safety & Health Agency finding</p>	<p>JAR-STD 1A.025 par.c requires that simulator operators comply with local health and safety standards, and must provide information about emergency escape arrangements, including items such as escape ladders and floor markings for emergency exits.</p>	<p>UK CAA/FOCA AND FAA SPECIAL CONDITION: FAA must check that the simulator operator has procedures in place for flight simulator occupants to be briefed to ensure that they are aware of all safety equipment and arrangements in the flight simulator in case of emergency.</p> <p>Additional Flyout Checklist point</p>
<p>Aircraft configuration (US vs. European)</p>		<p>UK CAA/FOCA AND FAA SPECIAL CONDITION: Each authority will include in its evaluation for the other authority the following:</p> <ul style="list-style-type: none"> • Systems –Configurable options for program pin selectable items • FMS databases • 8.33 KHz VHF comm. is the new European standard • BRNAV / GPS <i>–to be reviewed</i> • RVSM capabilities • ETOPS capability <p>Additional Flyout (Checklist point 3.4)</p>

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OTHER DIFFERENCES	JAA	SPECIAL CONDITION
Initiation of an evaluation request under the SIP		UK CAA/FOCA AND FAA SPECIAL CONDITION: Each authority will establish procedures ensuring that applicants seeking approval through a SIP provide that authorities original completed evaluation form, qualification letter, and any other associated documents to the authority in the SIP country from which they are seeking qualification.
<u>DOCUMENTS TO BE EXCHANGED:</u> 1. Evaluation reports: FAA and JAA use different standard forms for recording their evaluation findings. 2. Supplemental reports: All authorities will draft supplemental forms to document compliance/noncompliance with their required special conditions.		UK CAA/FOCA AND FAA SPECIAL CONDITION: Each authority performing a qualification on the other authority's behalf will establish procedures ensuring that the applicant provides the following to the other authority: 1. Evaluation report: The standard simulator evaluation report normally completed by the authority conducting the evaluation 2. Supplemental reports: The supplemental form documenting compliance/noncompliance with the special conditions imposed by the other authority.

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CHART 2

COMPARISON OF FAA AND JAA GENERAL SIMULATOR REQUIREMENTS FOR SIMULATORS QUALIFIED UNDER AC 120-40B AND JAR-STD 1A AMENDMENT 2

Note: “Tests required” as used in AC 120-40B Appendix 1 has two meanings: first, that the simulator’s performance must be documented in the particular area -- this is not to be confused with “objective testing” (which compares sim performance with aircraft performance.) With respect to such documentation, the FAA requires that the QTG contain the associated parameters (e.g., how was the simulator set up; under what conditions; what sequence of application was used; etc.) and the performance results recorded in the QTG for future reference in this area. “Tests required” may also indicate that there are objective tests associated with the item, which are described in appendix 2. This is the same approach taken by the ICAO Manual and JAR-STD 1A, AMT. 2, AMC 1A.030 par. 2.

Note: This chart provides information on the differences between simulator requirements used for the initial qualification by the FAA of simulators prior to the 1996 draft AC 120-40C and JAA JAR-STD 1A *Amendment 2*.

AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
1.a Cockpit, a full-scale replica of the airplane simulated. Direction of movement of controls and switches identical to that of airplane. The cockpit, for simulator purposes, consists of all that space forward of a cross-section of the fuselage at the most extreme aft setting of the pilots’ seats. Additional required crewmember duty stations and those required bulkheads aft of the pilot seats are also considered part of the cockpit and must replicate the airplane.	2.1a SAME AS 40B	UK CAA/FOCA AND FAA SPECIAL CONDITION: Although there is no difference in language this still generates an activity as described in Additional Flyout Checklist point
b. Circuit breakers that affect procedures and/or result in observable cockpit indications properly located and functionally accurate	2.1 b. SAME AS 40B	UK CAA/FOCA AND FAA SPECIAL CONDITION: Although there is no difference in language this still generates an activity as described in Additional Flyout Checklist point
c. Effect of aerodynamic changes for various combinations of drag and thrust normally encountered in flight corresponding to actual flight conditions, including the effect of change in airplane attitude, thrust, drag, altitude, temperature, gross weight, center of gravity location, and configuration.	2.1 c. SAME AS 40B	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
Appendix 1, CONT'D d. Ground opns generically represented to the extent that allows turns w/in the confines of the runway and adequate control on the landing and roll-out from a crosswind approach to a running landing (level A only)	2.1 m Comment: SAME AS 40B (level A only); n/a to the SIP.	NONE
e. All relevant instrument indications involved in the simulation of the applicable airplane automatically responded to control movement by a crewmember or external disturbances to the simulated airplane; i.e., turbulence or windshear. Comment: Numerical values must be presented in the appropriate units for U.S. opns, e.g., fuel in pounds, speed in knots, altitudes in feet, etc.	2.1 d SAME AS 40B Δ Numerical values should be presented in accordance with ICAO Annex 5	UK CAA/FOCA AND FAA SPECIAL CONDITION: Instrument indications to be checked for appropriate units of measurement (U.S. vs. metric). Additional Flyout Checklist point
f. Communications and navigation equipment corresponding to that installed in the applicant's airplane w/operation w/in the tolerances prescribed for the applicable airborne equipment.	Δ SAME AS 40B <i>PLUS</i> "caution and warning equipment" FAA covers under par. h; no SC required.	UK CAA/FOCA AND FAA SPECIAL CONDITION: Although there is no difference in language this still generates an activity as described in Flyout Checklist point
g. In addition to the flight crewmember stations, two suitable seats for the instructor/check airman and FAA inspector. The NSPM will consider options to this standard based on unique cockpit configurations. These seats must provide adequate vision to the pilot's panel and forward windows in visual system models. Observer seats need not represent those found in the airplane but must be equipped with similar positive restraint devices.	2.1 f SAME AS 40B. Note: the required number of seats is increased in JAR-STD 1A Amendment 3.	NONE
h. Simulator systems must simulate the applicable airplane system operation, both on the ground and in flight. Systems must be operative to the extent that normal, abnormal, and emergency operating procedures appropriate to the simulator application can be accomplished.	2.1 g SAME AS 40B	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
i. Instructor controls to enable the operator to control all required system variables and insert abnormal or emergency conditions into the airplane systems.	2.1 h SAME AS 40B	UK CAA/FOCA AND FAA SPECIAL CONDITION: Instructor station indications to be checked for appropriate units of measurement (U.S. vs. metric). Flyout Checklist point
j. Control forces and control travel which correspond to that of the replicated airplane. Control forces should react in the same manner as in the airplane under the same flight conditions.	2.1 i SAME AS 40B	NONE
k. Significant cockpit sounds which result from pilot actions corresponding to those of the airplane.	2.1 j SAME AS 40B	NONE
l. Sound of precipitation, windshield wipers, and other significant airplane noises perceptible to the pilot during normal operations and the sound of a crash when the simulator is landed in excess of landing gear limitations SOC required	Δ SAME AS 40B <i>EXCEPT: crash noise when landed “in excess of limitations”</i> Authorities do not consider significant. SOC required	NONE
LEVEL D ONLY: m. Realistic amplitude and frequency of cockpit noises and sounds, including precipitation, windshield wipers, precipitation static, and engine and airframe sounds. The sounds shall be coordinated with the weather representations required in FAR part 121, Appx H, Phase III (level D), Visual Requirement no. 3 SOC; tests required.	LEVEL D ONLY: 2.1 l SAME AS 40B, except calls out a different set of weather representations to be coordinated with (p. 2-C-57) Authorities agreed the basic concept is the same, no special condition necessary. Tests required.	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>LEVEL B, C, & D ONLY: n. Ground handling and aerodynamic programming to include:</p> <p>(1) Ground effect -- for example: roundout, flare, and touchdown. This requires data on lift, drag, pitching moment, trim, and power in ground effect</p> <p>(2) Ground reaction -- reaction of the airplane upon contact with the runway during landing to include strut deflections, tire friction, side forces, and other appropriate data such as weight and speed, necessary to identify the flight condition and configuration</p> <p>(3) Ground handling characteristics -- steering inputs to include crosswind, braking, thrust reversing, deceleration, and turning radius.</p> <p>SOC; tests required.</p>	<p>LEVEL B, C, & D ONLY (for level A, see above in 40B 1.d row) 2.m SAME AS 40B SOC required; tests required.</p>	<p>NONE</p>
<p>LEVELS C & D ONLY: o. Windshear models which provide training in the specific skills required for recognition of windshear phenomena and execution of recovery maneuvers. Such models must be representative of measured or accident derived winds, but may include simplifications which ensure repeatable encounters. For example, models may consist of independent variable winds in multiple simultaneous components. Wind models should be available for the following critical phases of flight:</p> <ol style="list-style-type: none"> 1) Prior to takeoff rotation 2) At liftoff 3) During initial climb. 4) Short final approach <p>The FAA Windshear Training Aid presents one acceptable means of compliance with simulator wind model requirements. The ATC should either reference the FAA Windshear Training Aid or present airplane related data on alternate methods implemented. Wind models from the RAE, the Joint Airport Weather Studies (JAWS) Project and other recognized sources may be implemented, but must be supported or properly referenced in the ATG</p> <p>Tests required.</p>	<p>LEVEL C&D SAME AS 40B <i>EXCEPT</i>: alternate wind model sources must be coordinated with the authority prior to submitting the IQTG for approval</p> <p>Tests required</p> <p>Simulators representing turbojet aircraft operated under Part 121 must meet the additional windshear requirements contained in Appendix 5 to AC 120-40B; see objective tests comparison.</p>	<p>UK CAA/FOCA AND FAA SPECIAL CONDITION:</p>
<p>p. Representative crosswinds and instructor controls for wind speed and direction</p>	<p>2.1 o SAME AS 40B</p>	<p>NONE</p>

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
LEVEL D ONLY: q. Representative stopping and directional control forces for at least the following runway conditions based on airplane related data. 1) Dry 2) Wet 3) Icy 4) Patchy wet 5) Patchy icy 6) Wet on rubber residue in touchdown zone SOC; objective tests for 1,2,3; subjective check for 4, 5, 6	LEVEL C&D ONLY: 2.1p SAME AS 40B SOC; objective tests for 1,2,3; subjective check for 4, 5, 6	NONE
LEVEL C & D ONLY: r. Representative brake and tire failure dynamics (including antiskid) and decreased brake efficiency due to brake temperatures based on airplane related data. SOC; tests required for decreased braking efficiency due to brake temperature.	LEVEL C& D ONLY: 2.1q SAME AS 40B SOC; tests required for decreased braking efficiency due to brake temperature (brake fade test, p. 2-C-50)	NONE
LEVELS C& D ONLY: s. A means for quickly and effectively testing simulator programming and hardware. This may include an automated system which could be used for conducting at least a portion of the tests in the ATG. SOC.	LEVELS C& D ONLY: 2.1 r SAME AS 40B	NONE
t. Simulator computer capacity, accuracy, resolution, and dynamic response sufficient for the qualification level sought. SOC; part 121 Appx H specifies computer standard for Phases II and III (Levels C&D)	2.1t SAME AS 40B SOC	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>LEVELS C & D ONLY:</p> <p>u. Control feel dynamics which replicate the airplane simulated. Free response of the controls shall match that of the airplane within the tolerance given in Appx.2. Initial and upgrade evaluation will include control free response (column, wheel, and pedal) measurements recorded at the controls. The measured responses must correspond to those of the airplane in takeoff, cruise, and landing configurations.</p> <p>1) For airplanes with irreversible control systems, measurements may be obtained on the ground if proper Pitot static inputs are provided to represent conditions typical of those encountered in flight. Engineering validation or airplane manufacturer rationale will be submitted as justification to ground test or omit a configuration.</p> <p>2) For sims requiring static and dynamic tests at the controls, special test fixtures will not be required during initial evaluations if the operator's ATG shows both test fixture results and alternate test method results, such as computer data plots, which were obtained concurrently. Repeat of the alternate method during the initial evaluation may then satisfy this test requirement.</p> <p>Tests required; see Appx 2, par.3</p>	<p>LEVELS C & D ONLY:</p> <p>SAME AS 40B</p> <p>Tests required; see p.2-C-42 and 2-C-60 to 62</p>	<p>NONE</p>

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>v. Relative responses of the motion system, visual system, and cockpit instruments shall be coupled closely to provide integrated sensory clues. These systems shall respond to abrupt pitch, roll, and yaw inputs at the pilot's position within 150/300 [A&B 300 msec, C&D, 150] msec of the time, but not before the time, when the airplane would respond under the same conditions. Visual scene changes from steady state disturbance shall occur within the system dynamic response limit of 150/300 [A&B 300 msec, C&D, 150] msec but not before the resultant motion onset. The test to determine compliance with these requirements should include simultaneously recording the analog output from the pilot's control column, wheel, and pedals, the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilots' seats, the output signal to the pilots' seats, the output signal to the visual system display (including visual system analog delays), and the output signal to the pilot's attitude indicator or an equivalent test approved by the Administrator. The test results in a comparison of a recording of the sim's response to actual airplane response data in the takeoff, cruise, and landing configuration. The intent is to verify that the simulator system transport delays or time lags are less than 150/300 msec and that the motion and visual cues relate to actual airplane responses. For airplane response, acceleration in the appropriate rotational axis is preferred.</p>	<p>2.1u SAME AS 40B</p>	<p>NONE</p>
<p>v. CONTINUED</p> <p>As an alternative, a transport delay test may be used to demonstrate that the simulator system does not exceed the specified limit of 150/300 msec. This test shall measure all the delay encountered by a step signal migrating from the pilots' control through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the motion system, to the visual system and instrument displays. A recordable start time for the test should be provided by a pilot flight control input. The test mode shall permit normal computation time to be consumed and shall not alter the flow of information through the hardware/software system. The transport delay of the system is then the time between the control input and the individual hardware responses. It need only be measured once in each axis, being independent of flight conditions. Tests required.</p>		

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
LEVEL D ONLY: w. Aerodynamic modeling which, for airplanes issued an original TC after June 1980, includes low-altitude level-flight ground effect, Mach effect at high altitude, effects of airframe icing, normal and reverse dynamic thrust effect on control surfaces, aeroelastic representations, and representations of nonlinearities due to sideslip based on airplane flight test data provided by the mfr. SOC; tests required; see appx 2, par.4 for info on ground effect. SOC must address mach effect, aeroelastic repns, and nonlinearities due to sideslip. Separate tests for thrust effects and a SOC and demonstration of icing effects are required.	LEVEL D ONLY: 2.1 v SAME AS 40B SOC required; notes are the same as 40B	NONE
LEVELS B, C, & D ONLY x. Aerodynamic and ground reaction modeling for the effects of reverse thrust on directional control. SOC; tests required.	LEVELS B, C, & D: 2.1 w. SAME AS 40B SOC; tests required.	NONE
LEVEL D ONLY: y. Self-testing for simulator hardware and programming to determine compliance with simulator performance tests as prescribed in appendix 2. Evidence of testing must include simulator number, date, time, conditions, tolerances, and appropriate dependent variables portrayed in comparison to the airplane standard. Automatic flagging of ‘out-of-tolerance’ situations is encouraged. SOC required	LEVEL D ONLY 2.1 x SAME AS 40B SOC required	NONE
LEVEL D ONLY: z. Diagnostic analysis printouts of simulator malfunctions sufficient to determine compliance with the Simulator Component Inoperative Guide (SCIG). These printouts shall be retained by the operator between recurring FAA simulator evaluations as part of the daily discrepancy log required under FAR Section 121.407(a)(5).	2.1 z JAR does not require a simulator inoperative components guide.	UK CAA/FOCA AND FAA SPECIAL CONDITION: INOPERATIVE COMPONENT PROCEDURES REQUIRED. SEE FSDQ 99-02.
aa. Timely permanent update of simulator hardware and programming subsequent to airplane modification.	2.1 y SAME AS 40B	NONE
bb. Daily preflight documentation either in the daily log or in a location easily accessible for review.	2.1z SAME AS 40B	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>3. Motion System a. Motion (force) cues perceived by the pilot representative of the airplane motions, i.e., touchdown cues, should be a function of the simulated rate of descent.</p> <p>LEVELS A & B ONLY: b. A motion system having a minimum of three degrees of freedom</p>	<p>2.2 Motion system a. SAME AS 40B</p> <p>Δ2.2b(1): calls for ‘sufficient cueing . . . to accomplish req’d tasks Δ2.2b(2) LEVEL B ONLY: SAME AS 40B 3(b)</p> <p>Authorities agreed no difference.</p>	NONE
<p>Motion system, continued LEVELS C & D: c. A motion system which produces cues at least equivalent to those of a six-degrees-of-freedom synergistic platform motion system. SOC; tests required.</p> <p>ALL LEVELS: d. A means for recording the motion response time for comparison with airplane data.</p> <p>LEVELS B, C, D: e. Special effects programming to include: 1) Runway rumble, oleo deflections, effects of ground speed and uneven runway characteristics. 2) Buffets on the ground due to spoiler/speedbrake extension and thrust reversal 3) Bumps after lift-off of nose and main gear 4) Buffet during extension and retraction of landing gear 5) Buffet in the air due to flap and spoiler/speedbrake extension 6) Stall buffet to, but not necessarily beyond, the FAA certificated stall speed, Vs 7) Representative touchdown cues for main and nose gear 8) Nosewheel scuffing 9) Thrust effect with brakes set</p>	<p>b (3) same as 40B 3(c)</p> <p>SOC; tests req’d for 2.2b 1-3</p> <p>2.2c: SAME AS 40B 3(d)</p> <p>2.2d SAME AS 40B Δ EXCEPT INCLUDES MACH BUFFET.</p> <p>Mach buffet is on FAA checklist.</p>	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>LEVEL D: f. Characteristic buffet motions that result from operation of the airplane (for example, high-speed buffet, extended landing gear, flaps, nosewheel scuffing, stall) which can be sensed at the flight deck. The simulator must be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to airplane data. Airplane data are also required to define flight deck motions when the airplane is subjected to atmospheric disturbances. General purpose disturbance models that approximate to demonstrable flight test data are acceptable. Tests with recorded results which allow comparison of relative amplitudes versus frequency are required. SOC; tests required.</p>	<p>2.2e SAME AS 40B SOC; tests required</p>	<p>NONE</p>
<p>4. Visual systems</p> <p>a. Visual system capable of meeting all the standards of this appx and appendices 2 and 3 (Validation and functions and subjective tests appendices) as applicable to the level of qualification requested by the applicant LEVELS A & B:</p> <p>b. Optical system capable of providing at least a 45 degrees horizontal and 30 degrees vertical field of view simultaneously for each pilot.</p> <p>LEVELS C & D: c. Continuous minimum collimated visual field of view of 75 deg horizontal and 30 deg vertical per pilot seat. Both pilot seat visual systems shall be able to be operated simultaneously. <i>note: wide angle systems providing cross cockpit viewing must provide a minimum of 150 degrees horizontal field of view; 75 per pilot seat operated simultaneously</i></p>	<p>2.2 Visual system A and b. SAME AS 40B EXCEPT: MINUS 40B 4(f). UK CAA/FOCA unconcerned.</p>	<p>NONE</p>

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>4. Visual systems, cont'd ALL LEVELS:</p> <p>d. A means for recording the visual response time for visual systems qualified under AC 121-14C and subsequent</p> <p>e. Verification of visual ground segment visual scene content at a decision height on landing approach. The ATG should contain appropriate calculations and a drawing showing pertinent data used to establish the airplane location and visual ground segment. Such data should include, but is not limited to:</p> <ol style="list-style-type: none"> 1) Airport and runway used. 2) Glide slope transmitter location for the specified runway 3) Position of the glide slope receiver antenna relative to the airplane main landing wheels 4) Approach and runway light intensity setting 5) Airplane pitch angle <p>The above parameters should be presented for the airplane in landing configuration and a main wheel height of 100 feet/30m above the touchdown zone. The visual segment and scene content should be determined for a RVR of 1200 feet/350 m.</p>	<p>2.3c</p> <p>2.3d</p>	<p>NONE</p> <p>UK CAA/FOCA AND FAA SPECIAL CONDITION:</p> <p>verification of initial ground segment to be performed using appropriate airport for UK CAA, FOCA, and FAA requirements.</p> <p>Additional Flyout Checklist point and Calculated VGS in QTG (Checklist point 5.1)</p>
f. For the NSPM to qualify precision weather minimum accuracy on simulators qualified under previous ACs, operators must provide the information provided in e above.	N/a	NONE
g. Visual cues to assess sink rate and depth perception during TO and landing	2.3e	NONE
h. Test procedures to quickly confirm visual system color, RVR, focus, intensity, level horizon & attitude as compared to the simulated attitude indicator	2.3f	NONE
i. Dusk scene to enable identification of a visible horizon & typical terrain characteristics such as fields, roads, and bodies of water	2.3g	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>Visual system, cont'd LEVELS C & D: j. A minimum of ten levels of occulting. This capability must be demonstrated by a visual model through each channel</p> <p>SOC; tests required.</p>	<p>2.3h SAME AS 40B</p> <p>SOC; tests req'd.</p>	NONE
<p>LEVEL D: k. Daylight, dusk, and night visual scenes with sufficient scene content to recognize airport, terrain, and major landmarks around the airport and to successfully accomplish a visual landing. The daylight visual scene must be part of a total daylight cockpit environment which at least represents the amount of light in the cockpit on an overcast day.</p> <p>Daylight visual system is defined as a visual system capable of producing, as a minimum, full color presentations, scene content comparable in detail to that produced by 4,000 edges, or 1,000 surfaces for daylight and</p> <p>4,000 light points for night and dusk scenes, 6 foot-lamberts of light measured at the pilot's eye position (highlight brightness), 3 arc-minutes resolution for the field of view at the pilot's eye, and a display which is free of apparent quantization and other distracting visual effects while the simulator is in motion.</p> <p>The simulator cockpit ambient lighting shall be dynamically consistent with the visual scene displayed. For daylight scenes, such ambient lighting shall neither 'washout' the displayed visual scene nor fall below 5 foot-lamberts of light as reflected from an approach plate at knee height at the pilot's station and/or 2 foot-lamberts of light as reflected from the pilot's face. All brightness and resolution requirements must be validated by an objective tests and will be retested at least yearly by the NSPM. Testing may be accomplished more frequently if there are indications that the performance is degrading on an accelerated basis. Compliance of the brightness capability may be demonstrated with a test pattern of white light using a spot photometer.</p>	<p>2.3 i, j, k, l) SAME AS 40B SOC; tests required.</p>	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2	Special Conditions
Appendix 1	AMC STD 1A.030 par. 2	
<p>Visual system, continued</p> <p>1) Contrast ratio. A raster drawn test pattern filling the entire visual scene (three or more channels) shall consist of a matrix of black and white squares no larger than 10 deg and no smaller than 5 deg per square with a white square in the middle of each channel. Measurement shall be made on the center bright square for each channel using a 1 deg. spot photometer. This value shall have a minimum brightness of 2 foot-lamberts. Measure any adjacent dark squares. The contrast ratio is the bright square value divided by dark square value.</p> <p>Minimum test contrast ratio result is 5:1.</p> <p>Note: Cockpit ambient light levels should be maintained at Level D (Phase III) reqts.</p> <p>2) Highlight brightness test. Maintaining the full test pattern described above, superimpose a highlight area completely covering the center white square of each channel and measure the brightness using the 1 degree spot photometer. Light points or light point arrays are not acceptable. Use of calligraphic capabilities to enhance raster brightness is acceptable.</p> <p>3) Resolution will be demonstrated by a test pattern of objects shown to occupy a visual angle of 3 arc-minutes in the visual scene from the pilot's eye point. This should be confirmed by calculations in the statement of compliance.</p> <p>4) Light point size -- not greater than 6 arc-minutes measured in a test pattern consisting of a single row of light points reduced in length until modulation is just discernible, a row of 40 lights will form a 4 degree angle or less.</p> <p>5) Light point contrast ratio -- not less than 25:1 when a square of at least 1 degree filled (i.e., light point modulation is just discernible) with light points is compared to the adjacent background.</p>	<p>2.3 SAME AS 40B</p>	<p>NONE</p>

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CHART 3

COMPARISON OF FAA AND JAA FUNCTIONS AND SUBJECTIVE TESTS FOR SIMULATORS QUALIFIED UNDER AC 120-40B AND JAR-STD 1A AMENDMENT 2

Note: All levels unless otherwise specified

AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
1. FUNCTIONS AND MANEUVERS	1. Functions and maneuvers	
a. Preparation for flight (1) Preflight. Accomplish a functions check of all switches, indicators, systems, and equipment at all crewmembers' and instructors' stations and determine that the cockpit design and functions are identical to that of the airplane simulated.	A(1). SAME AS 40B	NONE
b. Surface Operations (Pre-takeoff)		
(1) Engine start (i) Normal start (ii) Alternate start procedures (iii) Abnormal starts and shutdowns (hot start, hung start, etc.))	B(1) SAME AS 40B except list of abnormal starts specifies tail pipe fire. Authorities unconcerned.	NONE
Levels B,C,D only: (2) Pushback/powerback	b.(2) SAME AS 40B	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
(3) Taxi. (i) Thrust response (ii) Power lever friction (iii) Ground handling (iv) Nosewheel scuffing (v) Brake operation (normal and alternate/emergency) (vi) Brake fade (if applicable) (vii) Other	b.(3) ΔExcludes brake fade; addressed elsewhere.	NONE
c. Takeoff	c. Take-off	
(1) Normal (i) Engine parameter relationships (ii) Acceleration characteristics (iii) Nosewheel & rudder steering (iv) Crosswind (max demonstrated) (v) Special performance (vi) Instrument takeoff (vii) Landing gear, wing flap, leading edge operation (viii) Other	SAME AS 40B EXCEPT: (e) gives examples for special performance: reduced V1, max de-rate, short field operations (f) “Low visibility” takeoff [vs. instrument in 40B and ‘lowest’ in 40C; same thing] (g) Landing gear, wing flap/slats operation (same) JAA adds: (h) Contaminated runway operation; covered elsewhere by FAA	NONE
(2) Abnormal/Emergency (i) Rejected (ii) Rejected special performance (iii) With failure of most critical engine at most critical point along takeoff path (continued takeoff) (iv) With windshear (v) Flight control system failure modes (vi) Other	SAME AS 40B EXCEPT: (f) Rejected, brake fade (g) Rejected, contaminated runway These are covered elsewhere by FAA through methods contained in the RAeS handbook.[CS WILL DOUBLECHECK]	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
d. Inflight Operation		
(1) Climb (i) Normal (ii) One engine inoperative (iii) Other	SAME AS 40B	NONE
(2) Cruise (i) Perf characteristics (speed v. power) (ii) Turns w/without spoilers (speed brake) deployed (iii) High altitude handling (iv) High speed handling (v) Mach tuck and trim, overspeed warning (vi) Normal and steep turns (vii) Performance turns (viii) Approach to stalls (stall warning, buffet, and g-break) cruise, takeoff, approach, and landing configuration (ix) High angle of attack maneuvers (x) Inflight engine shutdown and restart (xi) Maneuvering with one engine inoperative (xii) Specific flight characteristics (xiii) Manual flight control reversion (xiv) Flight control system failure modes (xv) Other	SAME AS 40B EXCEPT: (4) High IAS handling -specifies that flight envelope protection includes bank limit -specifies that inflight engine restart must include assisted and windmill restart -reconfiguration modes Inflight engine starts and some flight envelope protections are included on the FAA evaluation checklist.	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
(3) Descent (i) Normal (ii) Maximum rate (iii) Manual flight control reversion (iv) Flight control system failure modes (v) Other	SAME AS 40B EXCEPT: - (2) Maximum rate (clean and with speedbrake) (3) With autopilot (4) Flight control system failures, reconfiguration modes	NONE
e. Approaches		
(1) Nonprecision (i) Approach procedure(s), one or more of the following: --NDB --VOR, RNAV, TACAN --DME ARC --LOC/BC --AZI, LDA, LOC, SDF --ASR (ii) Missed approach (iii) All engines operating (iv) One or more engines inoperative	4.3h Instrument approaches and landing (i) Δ Does not specify the range of nonprecision approaches covered by 40B; specifies only: (a) NDB (b) VOR, VOR/DME, VOR/TAC (c) RNAV (d) LLZ, LLZ/BC	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
(2) Precision		<p>UK CAA/FOCA AND FAA SPECIAL CONDITION: EACH SIDE WILL DETERMINE WHICH SUBJECTIVE TESTS ARE SPECIFIC TO A EUROPEAN OR AMERICAN AIRPORT, AND WILL PERFORM AT LEAST 1 CAT I, II, OR III (AS APPLICABLE) DEMONSTRATION AT AN AIRPORT OF THE OTHER AUTHORITY.</p> <p>Additional Flyout Checklist point</p>
<p>(2) (i) PAR (ii) ILS (A) Normal (B) Engine(s) inoperative (C) Category I published approach 1 Manually controlled with and without flight director to 100 feet below CAT I minima 2 With crosswind (max demonstrated) 3 With windshear</p>	<p>h. Instrument approaches and landing (1)</p> <p>(i) CAT I</p> <p>A. Manual approach with/without flight director including landing</p> <p>B. Autopilot/autothrottle coupled approach and manual landing</p> <p>C. Manual approach to DH and go-around, all engines</p> <p>D. Manual one engine out approach to DH and go-around</p> <p>E. Autopilot/autothrottle coupled approach, one engine out to DH and go-around</p> <p>F. Approach and landing with minimum/standby power</p> <p>FAA confirmed that it covers these items though not specifically called out in 40B.</p>	<p>UK CAA/FOCA AND FAA SPECIAL CONDITION: SEE ABOVE</p> <p>Additional Flyout Checklist point</p>

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
<p>(2) Precision, continued</p> <p>(D) Category II published approach</p> <ol style="list-style-type: none"> 1 Autocoupled, auto-throttle, autoland 2 All engines operating missed approach <p>(E) Category III published approach</p> <ol style="list-style-type: none"> 1 With generator failure 2 With 10 knot tailwind 3 With 10 knot crosswind 4 One engine inoperative <p>(iii) Missed approach</p> <ol style="list-style-type: none"> (A) All engines operating (B) One or more engines inoperative 	<p>(ii) Cat II</p> <p>A. Autopilot/autothrottle coupled approach to DH and landing</p> <p>B. Autopilot/autothrottle coupled approach to DH and go-around</p> <p>C. Autocoupled approach to DH and manual go-around</p> <p>FAA confirmed that it covers these items though not specifically called out in 40B.</p> <p>(iii) CAT III: Does not call out approach with generator failure</p> <p>A. Autopilot/autothrottle coupled to land and roll-out</p> <p>B. Autopilot/autothrottle coupled approach to DH/Alert height and go-around</p> <p>C. Autopilot/autothrottle coupled approach to land and roll-out with one engine out</p> <p>D. Autopilot/autothrottle coupled approach to DH/Alert height and go-around with one engine out</p> <p>FAA confirmed that it covers these items though not specifically called out in 40B.</p>	<p>UK CAA/FOCA AND FAA SPECIAL CONDITION: SEE ABOVE</p> <p>Additional Flyout Checklist point</p>

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
(3) Visual (i) Abnormal wing flaps/slats (ii) Without glide slope guidance	Δ i (1) Normal app and landing all engine operating with and without visual approach aid guidance (2) Operation of landing gear, flap/slats and speedbrakes (normal and abnormal)	NONE
f. Visual segment and landing	i. Visual approaches and landing	
(1) Normal LEVELS B,C,D ONLY: (i) Crosswind (max demonstrated) LEVELS UNCLEAR: (ii) From VFR traffic pattern LEVELS B,C,D ONLY: (iii) From nonprecision approach (iv) From precision approach ALL LEVELS: (v) From circling approach <u>NOTE:</u> Sims w/visual systems which permit completing a circling approach without violating 91.175(e) may be approved for <u>that particular</u> circling approach procedure	(4) crosswind: same (9) from visual pattern: same (1) without visual approach aid guidance? Same? (2) With visual approach aid guidance: same? (8) circling: same	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
(2) Abnormal/emergency (i) Engine(s) inop (ii) Rejected (iii) With windshear (iv) With standby (minimum electrical/hydraulic) power (v) With longitudinal trim malfunction (vi) With lateral-directional trim malfunction (vii) With loss of flight control power (manual reversion) (viii) With worst case failure of flight control system (most significant degradation of fly-by-wire system which is not extremely improbable) (ix) Other flight control failure modes as dictated by training program (x) Other	4.3i (2)engine inop: same rejected: ? (5) windshear: same electrical:? (7) trim malfunction: same loss of power: ? (6) worst case: same (6) other flight control system failures: same (10) other: same JAR also has: reconfiguration modes, manual reversion	NONE
g. Surface operations (post landing)		
LEVELS B,C, D: (1) Landing roll and taxi (i) Spoiler operation (ii) Reverse thrust operation (iii) Directional control and ground handling, both with and without reverse thrust (iv) Reduction of rudder effectiveness with increased reverse thrust (rear pod-mounted engines) (v) Brake and anti-skid operation with dry, wet, and icy conditions (vi) Brake operation (vii) Other	SAME AS 40B	NONE
h. Any flight phase		

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
(1) Airplane & powerplant systems operation (i) Air conditioning (ii) Anti-icing/de-icing (iii) Auxiliary powerplant (iv) Communications (v) Electrical (vi) Fire detection and suppression (vii) Flaps/slats/speed brakes (viii) Flight controls (ix) Fuel and oil (x) Hydraulic (xi) Landing gear (xii) Oxygen (xiii) Pneumatic (xiv) Powerplant (xv) Pressurization	SAME AS 40B: plus: (i) Pressurization (vi) Fire and smoke detection	NONE
(3) Airborne procedures (i) Holding LEVEL C & D ONLY: (ii) Air hazard avoidance All levels (iii) Windshear	SAME AS 40B EXCEPT: Holding -- LEVELS B,C,D Windshear--LEVELS C& D ONLY	NONE
(4) Engine shutdown and parking (i) Engine and systems operation (ii) Parking brake operation (iii) Other	SAME AS 40B	NONE
2. VISUAL SYSTEM	4.3m Visual system	
a. Accurate portrayal of environment relating to simulator attitudes	(1) same	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
b. Distances at which runway features are visible should not be less than those listed below. Distances are measured from runway threshold to an airplane aligned with the runway on an extended 3 degree glide slope. (1) Runway definition, strobe lights, approach lights, runway edge white lights, and VASI lights from 5 statute miles of the runway threshold (2) Runway centerline lights and taxiway definition from 3 statute miles (3) Threshold lights and touchdown zone lights from 2 statute miles (4) Runway markings within range of landing lights for night scenes; as required by 3 arc-minutes resolution on day scenes	(2) same	NONE
c. Representative airport scene content including: (1) Airport runways and taxiways (2) Runway definition (i) Runway surface and markings (ii) Lighting for the runway in use including runway edge and centerline lighting, touchdown zone, VASI, and approach lighting of appropriate colors (iii) Taxiway lights	(3) same	NONE
d. Operational landing lights	(4) same	NONE
e. Instructor controls of: (1) Cloudbase (2) Visibility in statute miles and RVR in feet (3) Airport selection (4) Airport lighting	(5) same	UK CAA/FOCA AND FAA SPECIAL CONDITION Additional Flyout Checklist point
f. Visual system compatibility with aerodynamic programming	(6) same	NONE
g. Visual cues to assess sink rates and depth perception during landings. (1) Surface on taxiways and ramps (2) Terrain features	(7) same	NONE
h. Dusk and night visual scene capability	4.3 m (8) same	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
i. Minimum of three specific airport scenes (1) Surfaces on runways, taxiways, and ramps (2) Lighting of appropriate color for all runways including runway edge, centerline, VASI, and approach lighting for the runway in use (3) Airport taxiway lighting (4) Ramps and terminal buildings which correspond to an operator's Line-Oriented Flight Training and Line Oriented Simulator scenarios	(9) same	UK CAA/FOCA AND FAA SPECIAL CONDITION Flyout Checklist point
j. General terrain characteristics and significant landmarks	(10) same	NONE
k. At and below an altitude of 2000 feet height above the airport and within a radius of 10 miles from the airport, weather representations, including the following: (1) Variable cloud density (2) Partial obscuration of ground scenes; the effect of a scattered to broken cloud deck (3) Gradual break out (4) Patchy fog (5) The effect of fog on airport lighting	(11) same	NONE
l. A capability to present ground and air hazards such a another airplane crossing the active runway or converging airborne traffic	(12) same	NONE
m. Operational visual scenes which portray representative physical relationships known to cause landing illusions such as short runaways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, and unique topographic features	(13) same	NONE
n. Special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff, approach, and landings at and below an altitude of 2000 feet above the airport surface and within a radius of 10 miles from the airport	(14) same	NONE
o. Wet and snow-covered runways including runway lighting reflections for wet, partially obscured lights for snow, or suitable alternative effects	(15) same	NONE
p. Realistic color and directionality of airport lighting	(16) same	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
q. Weather radar presentations in airplanes where radar information is presented on the pilot's navigation instruments. Radar returns should correlate to the visual scene	(17) same	NONE
r. Freedom from apparent quantization (aliasing).	(18) same	NONE
3. SPECIAL EFFECTS		
a) Runway rumble, oleo deflections, effect of ground speed and uneven runway characteristics b) Buffets on the ground due to spoiler/speedbrake extension and thrust reversal c) Bumps after lift-off of nose and main gear d) Buffet during extension and retraction of landing gear e) Buffet in the air due to flap and spoiler/speedbrake extension and approach-to-stall buffet f) Touchdown cues for main and nose gear g) Nose-wheel scuffing h) Thrust effect with brakes set i) Representative brake & tire failure dynamics (including antiskid) and decreased brake efficiency due to high brake temps based on airplane related data. These representations should be realistic enough to cause pilot identification of the problem and implementation of appropriate procedures. Sim pitch, side loading and directional control characteristics should be representative of the airplane.	SAME AS 40B	NONE

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AC 120-40B Appx 3, Functions & Subjective Tests	JAR-STD 1A.030, Amendment 2 par.4.3, Functions & Subjective Tests	SPECIAL CONDITION
<p>Special effects, continued</p> <p>j) sound of precipitation and significant airplane noises perceptible to the pilot during normal operations and the sound of a crash when the simulator is landed in excess of landing gear limitations. Significant airplane noises should include noises such as engine, flaps, gear and spoiler extension and retraction and thrust reversal to a comparable level as that found in the airplane. The sound of a crash should be related in some logical manner to landing in an unusual attitude or in excess of the structural gear limitations of the airplane.</p> <p>k) effects of airframe icing</p>	SAME AS 40B	NONE

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CHART 4

COMPARISON OF FAA AND JAA OBJECTIVE TESTS FOR SIMULATORS QUALIFIED UNDER AC 120-40B AND JAR-STD 1A AMENDMENT 2

Note: This chart provides information on the differences between simulator requirements used for the initial qualification by the FAA of simulators prior to the 1996 draft AC 120-40C and JAA JAR-STD 1A *Amendment 2*. It also includes 40B Appendix 5 Windshear objective test requirements.

This chart reflects discussions and decisions at the 7/23-7/25/03 meeting in Washington between the FAA, UK CAA, and Swiss FOCA.

Key: Flight Condition: G= Ground, TO = Takeoff

Evaluation required for: I= Initial, R = Recurrent; and all levels unless otherwise specified

AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
1. Discussion						
Table					PAR. 3.3	
I. Performance: a. TAXI (1) Minimum radius turn	±3 ft or 20% of airplane turn radius	G/TO	Levels B,C,D: IR		1) (a)(1) SAME EXCEPT comments specify that both main and nose gear radii to be recorded; test to be without use of brakes and minimum thrust, except for aircraft requiring asymmetric thrust or braking to turn 7/23/03 meeting: UK CAA and FOCA not concerned by this, no SC	NONE
(2) Rate of turn vs. nosewheel steering angle	±10% or ±2°/sec turn rate	G/TO	Levels B,C,D: IR		(a)(2) SAME EXCEPT comments specify that a minimum of 2 speeds are to be recorded, greater than minimum turning radius speed, w/a spread ≥5 kts 7/23/03 meeting: FAA does this per the RaeS handbook. No SC	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
b. TAKEOFF (1) Ground acceln Time & Distance	±5% Time and Distance or ±5% time and ±200 feet of distance	G/TO	IR	Unfactored certification data may be used. Acceleration time & distance should be recorded for a min of 80% of total segment, brake release to Vr	(b) (1) SAME	NONE
(2) Min control speed ground (Vmcg) using aerodynamic controls only or low speed, engine inop ground control characteristics	Maximum Airplane lateral deviation ±25% or ±5 ft	G/TO	IR	Engine failure speed must be ±1 knot of airplane engine failure speed	(b)(2) SAME ΔPLUS: Comments require that engine thrust decay must be that resulting from the mathematical model for the engine variant applicable to the sim under test. If the modeled engine variant is not the same as the airplane mfr's flight test engine, then a further test may be run w/the same in initial conditions using the thrust from the flight test data as the driving parameter. Airplanes w/reversible flight control systems must also plot rudder pedal force [±10% or ±2.2daN (5lb)] FAA approaches this in the same general manner.	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(3) Minimum unstick speed or equivalent as provided by manufacturer	±3 kts airspeed ±5° pitch	G/TO	IR	Vmu = speed at which last main LG leaves ground. Main LG strut compression or equivalent air/ground signal should be recorded. Record as a minimum from 10 kts before start of rotation	3.3 (b) (3) SAME AS 40B <i>PLUS:</i> Elevator input should precisely match aeroplane data. 7/23/03 meeting: FAA practice matches this, no SC needed	NONE
(4) Normal takeoff	±5 kts airspeed ±1.5° pitch ±1.5° angle of attack ±20 ft altitude ±5 lb or ±10% column force**	G/TO/ and FIRST SEGMENT CLIMB	IR	Record TO profile from brake rls to at least 200 ft AGL. ** applies only to reversible control systems	3.3(b)(4) SAME AS 40B	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(5) Critical engine failure on takeoff	±3kts airspeed ±1.5° pitch ±1.5° angle of attack ±20 ft altitude ±2° bank and sideslip angle ±5 lb or ±10% column force** ±5 lb or ±10% rudder pedal force** ±3 lb or ±10% aileron wheel force**	G/TO/ and FIRST SEGMENT CLIMB	IR	Record TO profile at maximum TO weight to at least 200 ft AGL Engine failure speed must be w/in ±3 kts of airplane data. ** applies only to reversible control systems	3.3(b) (5) SAME AS 40B EXCEPT: does not specify angle of attack; 7/23/03 meeting: UK CAA AND FOCA practice matches this, no SC needed test "NEAR" max TO weight, 7/23/03 meeting: FAA considers this not significant, no SC and adds: CCA: Test in Normal and Non-normal control state 7/23/03 meeting: FAA checks this by virtue of an FAA/European authority agreement relating to Airbus and CCA's (there is an FAA-UK,LBA,DGAC agreement that we will check this). See JAA TGL5 on this. FAA is also issuing guidance (an FSDQG) to cover this matter. No SC required.	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(6) Cross wind takeoff	±3kts airspeed ±1.5° pitch ±1.5° angle of attack ±20 ft altitude ±2° bank and sideslip angle ±5 lb or ±10% column force** ±5 lb or ±10% rudder pedal force** ±3 lb or ±10% aileron wheel force**	G/TO/ and FIRST SEGMENT CLIMB	IR	Record TO profile to at least 200 ft AGL w/same relative wind profile as airplane test ** applies only to reversible control systems	3.3(b) (6) SAME AS 40B except specifies that test data is to be for the maximum demonstrated crosswind, if available 7/23/03 meeting: FAA does this per the RAeS handbook. No SC	NONE
(7) Rejected TO	Overall Distance? <i>TBD</i> Braking effort <i>TBD</i>	Ground	IR	Auto brakes to be used where applicable. Maximum braking effort, Auto or Manual	3.3 (b) (7)Δ ±5% time; ±1.5 s; ±7.5% Distance or ±250 ft. Record near Max TO weight; autobrakes to be used where applicable; max braking effort, auto or manual. Time & distance should be recorded from brake release to a full stop. 7/23/03 meeting: FAA does a much more general test without tolerances; UK CAA and FOCA do not consider this significant. No SC	UK CAA/FOCA AND FAA SPECIAL CONDITION Additional Flyout Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
NOT COVERED IN 40B					3.3 (b) (8) Dynamic engine failure after takeoff: ± 20% Body rates; 1st segment climb; failure speed w/in ±3 kts of airplane data. Engine failure may be a snap deceleration to idle. Record hands off from 5 secs before engine failure to +5 secs or 30 deg bank, whichever occurs first, and then hands on until wings level recovery 11/18/03 meeting: UK CAA and FOCA will have to determine how this will affect what level they will qualify to; but no SC required CCA: Test in Normal and Non-normal control state Additional Objective Testing Checklist point	UK CAA/FOCA SPECIAL CONDITION Additional test(s) to be added to the QTG
c. CLIMB (1) Normal climb, All engines op	±5 kts airspeed ±5% or ±100 fpm climb rate	Climb w/ all engines operating	IR	May be a Snapshot Test. Mfr's gross climb gradient may be used for flight test data	3.3(c)(1) SAME AS 40B EXCEPT provides for recording at nominal climb speed and mid initial climb altitude. 7/23/03 meeting: UK CAA and FOCA consider insignificant difference, no SC required	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(2) One engine inop, 2nd segment climb	±5 kts airspeed ±5% or ±100 fpm climb rate but not less than FAA- approved AFM rate of climb	Climb w/all engines operating	IR	May be a Snapshot Test. Mfr's gross climb gradient may be used for flight test data. Test at weight, altitude, and temperature limited conditions.	(2) SAME AS 40B	NONE
(3) One engine inop approach climb for a/c w/icing accountability	±5 kts airspeed ±5% or ±100 fpm climb rate but not less than FAA- approved AFM rate of climb	Approach climb w/one engine inop	IR	May be a Snapshot Test. Mfr's gross climb gradient may be used for flight test data. Test at weight, altitude, and temperature limited conditions. Use near maximum landing weight	(4) SAME AS 40B	NONE
					Δ JAR-STD ALSO HAS: 3.3(c)(3): One engine inop en route climb, same as 40C 7/23/03 meeting: UK CAA and FOCA will need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Additional Flyout or Applicant to review ATMs Additional Objective Testing Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
d. Stopping (1) Deceleration time & distance, wheel brakes using manual braking, dry runway (no reverse thrust)	±5% of time. For distance up to 4000 ft, ±200 ft or ±10% whichever is smaller. For greater than 4000 ft, ±5% of distance	Landing	IR	Time and distance should be recorded for at least 80% of total segment (TD to full stop). Brake system pressure should be available.	(1) SAME AS 40B EXCEPT: brake system pressure should be available; Engineering data may be used for medium and light gross weight conditions. Data is required for medium, light, and near maximum landing gross weights. 7/23/03 meeting: UK CAA and FOCA will need to consider for SC; they use 3 weights, we use one; weights not strictly defined	UK CAA/FOCA SPECIAL CONDITION Accept differences Applicant to review ATMs Additional Flyout Checklist point
(2) Deceleration time & distance, reverse thrust, dry runway (no wheel braking)	±5% time and the smaller of ±10% or 200 feet of distance	landing	IR	Time and distance should be recorded for at least 80% of the total demonstrated reverse thrust segment	(1) SAME AS 40B EXCEPT: brake system pressure should be available; Engineering data may be used for medium and light gross weight conditions. Data is required for medium, light, and near maximum landing gross weights. 7/23/03 meeting: UK CAA and FOCA will need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Accept differences Applicant to review ATMs Additional Flyout Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels C & D: (3) Stopping time & distance, wheel brakes, wet runway (no reverse thrust)	Representative stopping time and distance	landing	I	FAA approved AFM data acceptable.	Δ Levels B,C, & D: 3.3(e)(3) does not specify no reverse thrust; tolerance is specified at ±10% or ±200 feet of distance; and AFM data <i>should</i> be used where available 7/23/03 meeting: UK CAA and FOCA consider the same, no SC required	UK CAA/FOCA SPECIAL CONDITION Additional Flyout Checklist point
Levels C&D: (4) Stopping time & distance, wheel brakes, icy runway (no reverse thrust)	Representative stopping time and distance	landing	I	FAA approved AFM data acceptable	Δ Levels B,C, & D: 3.3(e)(3) does not specify no reverse thrust; tolerance is specified at ±10% or ±200 feet of distance. AFM data <i>should</i> be used where available. 7/23/03 meeting: UK CAA and FOCA and FAA unconcerned, no SC required	UK CAA/FOCA SPECIAL CONDITION Additional Flyout Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
e. ENGINES (1) Acceleration	$T_i \pm 10\%$ $T_t \pm 10\%$	Ground/Takeoff	IR	T_i = total time from initial throttle movement until a 10% response of a critical engine parameter T_t = total time from T_i to 90% go-around power. Critical engine parameter should be a measurement of power(N_1 , N_2 , EPR, Torque, etc.). Plot from flight idle to go-around power for a rapid (slam) throttle movement.	SAME AS 40B	NONE
(2) Deceleration	$T_i \pm 10\%$ $T_t \pm 10\%$	Ground/Takeoff	IR	Test from maximum takeoff power to 10% of maximum takeoff power (90% decay in power). Time history should be provided.	SAME AS 40B	NONE
2. Handling Qualities a. Static Control Checks				<i>NOTE:</i> Column, wheel, and pedal position vs. force shall be measured at the control. An alternate method acceptable to the NSPM in lieu of the test fixture at the controls is to instrument the simulator in an equivalent manner to the flight test airplane. The force & position data from this instrumentation can be directly recorded and matched to the airplane data. Such a permanent installation would eliminate the need for installation of external devices.	SAME NOTE AS 40B except says “vs. force or time ” 7/23/03 meeting: UK CAA and FOCA unconcerned, no SC required	

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(1) Column position vs. force & surface posn. calibration	±2 lbs (.89 daN) breakout ±5 lbs (2.224 daN) or ±10% force ±2° elevator	Ground	IR	Uninterrupted control sweep, stop to stop	SAME AS 40B but also: calls for validation with “in flight data from tests such as Longitudinal static stability, stalls, etc.” Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. 7/23/03 meeting: This relates only to reversible controls; UK CAA and FOCA will need to consider for SC CCA: Position vs. force not applicable if airplane cockpit controller is used.	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout Additional Flyout Checklist point
(2) Wheel posn vs. force & surface posn calibration	±2 lbs (.89 daN) breakout ±3 lbs (1.334 daN) or ±10% force ±1° aileron ±3° spoiler	Ground	IR	Uninterrupted control sweep, stop to stop	SAME AS 40B but also: calls for validation with “in flight data from tests such as Engine Out Trims, Steady State Sideslips, etc. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. 7/23/03 meeting: UK CAA and FOCA need to consider and: CCA: Position vs. force not applicable if airplane cockpit controller is used	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout Additional Flyout Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(3) Pedal position vs. force & surface position calibration	±5 lb (2.24 daN) breakout ±5 lb (2.224 daN) or 10% force ±2° rudder	Ground	IR	Uninterrupted control sweep, stop to stop	SAME AS 40B but also: calls for validation with “in flight data from tests such as Engine Out Trims, Steady State Sideslips, etc. Static and dynamic flight control tests should be accomplished at the same feel or impact pressures. 7/23/03 meeting: UK CAA and FOCA need to consider and: CCA: Position vs. force not applicable if airplane cockpit controller is used	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout Additional Flyout Checklist point
(4) Nosewheel steering force & position	±2 lb (.89 daN) breakout ±3 lb (1.334 daN) or ±10% force ±2° nosewheel angle	ground	IR	Uninterrupted control sweep, stop to stop	SAME AS 40B	NONE
(5) Rudder pedal steering calibration	±2° NWA	ground	IR	? NO COMMENT	SAME AS 40B BUT ALSO: ±.5° deadband AND Uninterrupted control sweep, stop to stop FAA takes the same approach in practice.	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(6) Pitch trim calibration; indicator vs. computed	±0.5° of computer trim angle ±10% trim rate	Ground and go-around	IR	Measure trim rate for go-around. Trim rate input and surface rate time history is appropriate.	SAME AS 40B except: measure trim at pilot primary induced trim rate (ground) and autopilot or primary trim rate in flight at go around flight conditions. 7/23/03 meeting: UK CAA and FOCA need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout: Additional Flyout Checklist point
(7) Alignment of power lever angle vs. selected engine parameter (EPR, N ₁ , torque, etc.)	±5° of power lever angle	Ground	IR	Simultaneous recording for all engines. A 5° tolerance applies against airplane data and between engines. May be Snapshot test.	SAME AS 40B	NONE
					AND: Note: in the case of propeller powered airplanes, if an additional lever, usually referred to as the propeller lever, is present, it should also be checked. Where these levers do not have angular travel, a tolerance of ±2 cm (±.8 inches) applies 7/23/03 meeting: FAA does this subjectively; UK CAA and FOCA need to consider if they need objective as well; may be SC	UK CAA/FOCA SPECIAL CONDITION Refer to simulator calibration procedures. As basis for soc by applicant Additional Objective Testing Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(8) Brake pedal position vs. force	±5 lbs (2.24 daN) or 10% [?force?] ±10% or 150 psi (1033 kPa) brake hydraulic pressure		IR	Simulator computer output results may be used to show compliance. Relate hydraulic system pressure to pedal position in a ground static test.	SAME AS 40B	NONE
\b. Dynamic control checks				<i>NOTE:</i> Column, wheel, and pedal position vs. force or time shall be measured at the control. An alternate method acceptable to the NSPM in lieu of the test fixture at the controls is to instrument the simulator in an equivalent manner to the flight test airplane. The force and position data from this instrumentation can be directly recorded and matched to the airplane data. Such a permanent installation would eliminate the need for installation of external devices.	SAME AS 40B	
Levels C&D (1) Pitch control	±10% of time for first zero crossing and ±10(n+1)% of period thereafter ±10% amplitude of first overshoot. ±20% of amplitude of second and subsequent overshoots greater than 5% of initial displacement. ±1 overshoot	Takeoff, cruise, and landing	IR	Data should be normal control displacement in both directions. Approximately 25% to 50% of full throw. n is the sequential period of a full cycle of oscillation Refer to par.3 this appendix	SAME AS 40B BUT ALSO: “Tolerances apply against the absolute values of each period (considered independently.)” 7/23/03 meeting: UK CAA and FOCA unconcerned, no SC required CCA: Test not applicable if airplane cockpit controller is installed in the simulator	NONE
Levels C&D: (2) Roll control	Same as (1) above	Takeoff, cruise, and landing	IR	Same as (1)	SAME AS ABOVE	NONE
Levels C&D: (3) Yaw control	Same as (1) above	Takeoff, cruise, and landing	IR	Same as (1)	SAME AS ABOVE	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
ANOT IN 40B					(4) Small control inputs: ±20% body rates in cruise & approach; small control inputs defined as 5% of total travel 7/23/03 meeting: UK CAA and FOCA need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Additional test(s) to be added to the QTG Additional Objective Testing Checklist point
c. Longitudinal (1) Power change dynamics	±3 kts airspeed ±100 ft altitude ±20% or ±1.5°pitch	Approach to go-around	IR	Wing flaps should remain in the approach position. Time history of uncontrolled free response for time increment from 5 seconds before initiation of the configuration change to 15 seconds after completion of the configuration change.	SAME AS 40B except “time increment equal to <i>at least</i> 5 seconds before initiation etc.” 7/23/03 meeting: CAA and FOCA unconcerned, no SC required CCA: Test in normal and Non- normal Control state.	NONE
(2) Flap/slat change dynamics	±3 kts airspeed ±100 ft altitude ±20% or ±1.5°pitch	Retraction, after takeoff, extension, approach to landing	IR	Time history of uncontrolled free response for time increment from 5 secs before the initiation of the configuration change to 15 seconds after completion of the configuration change.	SAME AS 40B except no reference to “slats” “time increment equal to <i>at least</i> 5 seconds before initiation etc.” 7/23/03 meeting: FAA unconcerned, no SC required CCA: Test in normal and Non- normal Control state.	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(3) Spoiler/ speedbrake change dynamics	±3 kts airspeed ±100 ft altitude ±20% or ±1.5°pitch	Cruise	IR	Time history of uncontrolled free response for time increment from 5 secs before the initiation of the configuration change to 15 seconds after completion of the configuration change.	SAME AS 40B except “time increment equal to <i>at least</i> 5 seconds’ etc. and also: Results required for both extension and retraction. 7/23/03 meeting: CAA and FOCA cover, no SC CCA: Test in normal and Non-normal Control state	NONE
(4) Gear change dynamics	±3 kts airspeed ±100 ft altitude ±20% or ±1.5°pitch	Takeoff to second segment climb, approach to landing	IR	Time history of uncontrolled free response for time increment from 5 secs before the initiation of the configuration change to 15 seconds after completion of the configuration change.	SAME AS 40B except “time increment equal to <i>at least</i> 5 seconds’ etc. and also: Results required for both extension and retraction. 7/23/03 meeting: UK CAA and FOCA cover, no SC CCA: Test in normal and Non-normal Control state	NONE
(5) Gear and flap/slat operating times	±1 second or 10% of time	Takeoff, approach	IR	Normal and alternate flaps, extension and retraction. Normal gear, extension and retraction. Alternate gear, extension only.	SAME AS 40B except refers to “air loaded” in flight condition and: 7/23/03 meeting: UK CAA and FOCA concerned, no SC all data for full range (intermediate increment times not required). Tabular data from production airplanes are acceptable.	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(6) Longitudinal trim	±1°pitch control (stab & elev.) ±1°pitch angle ±5% net thrust or equivalent	Cruise, approach, landing	IR	May be snapshot tests.	SAME AS 40B except refers to a "SERIES" of snapshot tests. 7/23/03 meeting: UK CAA and FOCA unconcerned, no SC CCA: Test in normal and Non-normal Control state	NONE
(7) Longitudinal maneuvering stability (stick force/g)	±5 lb (±2.24 daN) or ±10% column force or equivalent surface	Cruise, approach, landing	IR	May be series of Snapshot Tests. Force or surface deflection must be in correct direction. Approximately 20, 30, and 45 degree bank angle should be presented	SAME AS 40B EXCEPT: specifies 20 and 30 deg bank for approach and landing configurations; 20,30, and 45 bank for cruise configuration 7/23/03 meeting: FAA unconcerned, no SC CCA: Test in normal and Non-normal Control state	NONE
(8) Longitudinal static stability	±5 lb (±2.24 daN) or ±10% column force or equivalent surface	Approach	<i>NOT SPECIFIED?? TYPO?</i>	Data for at least 2 speeds above and 2 speeds below trim speed. May be a series of Snapshot Tests	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
(9) Stick shaker, airframe buffet, stall speeds	±3 kts airspeed ±2° bank for speeds higher than stick shaker or initial buffet	Second segment climb and approach and landing	IR	Stall warning signal should be recorded and must occur in the proper relation to stall.	SAME AS 40B but also: Airplanes exhibiting a sudden pitch attitude change or 'g break' should demonstrate this characteristic and Airplanes w/reversible flight control systems should also plot stick/column force (±10% or ±2.2 daN) 7/23/03 meeting: CAA and FOCA need to consider for SC CCA: Test in normal and Non-normal Control state	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout
(10) Phugoid dynamics	±10% of period ±10% of time to 1/2 or double amplitude or ±.02 of damping ratio	Cruise	IR	Test should include 3 full cycles (6 overshoots after input completed) or that sufficient to determine time to 1/2 amplitude whichever is less.	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE
Levels B,C,D (11) Short period dynamics	∴ ±1.5 ° period or ±2°/second pitch rate; ±0.1 g normal acceleration	Cruise	IR		SAME AS 40B 7/23/03 meeting: neither side concerned, no SC	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
d. Lateral Directional: (1) Minimum control speed, air (V_{mca}), per applicable airworthiness standard or Low speed engine inop handling characteristics in air	± 3 kts airspeed	Takeoff or landing (whichever is most critical in airplane)	IR	V_{mca} may be defined by a performance or control limit which prevents demonstration of V_{mca} in the conventional manner.	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE
(2) Roll response (rate)	$\pm 10\%$ or $\pm 2^\circ/\text{sec}$ roll rate	Cruise and approach or landing	IR	Test w/normal wheel deflection (about 30%).	SAME AS 40B but also: Airplanes w/reversible flight control systems should also plot wheel force ($\pm 10\%$ or ± 1.3 daN) 7/23/03 meeting: CAA and FOCA need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout
(3) Roll response to roll controller step input	$\pm 10\%$ or $\pm 2^\circ/\text{sec}$ roll rate	Approach or landing	IR	Roll rate response	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE
(4) Spiral stability	Correct trend, $\pm 2^\circ$ bank or $\pm 10\%$ in 20 seconds	Cruise	IR	Airplane data averaged from multiple tests may be used. Test for both directions.	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE
(5) Engine inop trim	$\pm 1^\circ$ rudder angle or $\pm 1^\circ$ tab angle or equivalent pedal $\pm 2^\circ$ sideslip angle	Second segment and approach or landing	IR	May be Snapshot Tests.	SAME AS 40B	NONE
(6) Rudder response	$\pm 2^\circ/\text{second}$ or $\pm 10\%$ yaw rate	Approach or landing	IR	Test w/ stability augmentation ON and OFF. Rudder step input of approximately 25% rudder throw.	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels B,C,D (7) Dutch roll (yaw damper off)	±.5 sec o ±10% of period. ±10% of time to 1/2 or double amplitude or ±.02 of damping ratio. ±20% or ±1 sec of time difference between peaks of bank and sideslip	Cruise and approach or landing	IR	Test for at least 6 cycles with stability augmentation OFF>	SAME AS 40B CCA: Test in normal and Non-normal Control state	NONE
(8) Steady state sideslip	For a given rudder position ±2°bank, ±1°sideslip, ±10% or ±2°aileron, ±10% or ±5°spoiler or equivalent wheel posn	Approach or landing	IR	May be a series of Snapshot Tests.	SAME AS 40B EXCEPT: calls out 'equivalent wheel position <i>or force</i> '; specifies that Snapshot tests must use at least two rudder positions (in each direction for prop driven airplanes); and Airplanes w/reversible flight control systems should also show Wheel Force (±10% or ±1.3daN) and rudder pedal force (±10% or ±2.2 daN) 7/23/03 meeting: CAA and FOCA need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout Additional Flyout Checklist point

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels B,C,D e. LANDINGS (1) Normal landing	± 3 kts airspeed ± 1.5°pitch ±1.5° angle of attack ± 10% altitude or ± 10 feet t±2°bank angle ±2°sideslip or yaw angle	Landing	IR	Test from a minimum of 200 feet AGL to nosewheel touchdown. Derotation may be shown as a separate segment from the time of main gear touchdown.	SAME AS 40B but also: Medium, light, & near max landing weights should be shown and Airplanes w/reversible flight control systems should also show Wheel Force (±10% or ±1.3daN) and rudder pedal force (±10% or ±2.2 daN) 7/23/03 meeting: UK CAA AND FOCA need to consider for SC CCA: Test in normal and Non-normal Control state	UK CAA/FOCA SPECIAL CONDITION Accept differences Additional Flyout Checklist point
NOT IN 40B					(2) Minimum/no flap landing: Minimum certified landing flap configuration: ± 3 kts airspeed ± 1.5°pitch ±1.5° angle of attack ± 10% altitude or ± 10feet 7/23/03 meeting: UK CAA AND FOCA need to consider for SC	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels B, C,D (2) Crosswind landing	± 3 kts airspeed ± 1.5°pitch ±1.5° angle of attack ± 10% altitude or ± 10feet ±2°bank angle ±2°sideslip angle or yaw angle	Landing	IR	Test from a minimum of 200 feet AGL to nosewheel touchdown and rollout to 60 kts. Use near max landing weight w/same relative wind profile as aircraft test.	<p>SAME AS 40B EXCEPT: doesn't call out yaw angle;</p> <p>Calls for test from 200 ft AGL to a 50% decrease in MLG touchdown speed.</p> <p>Requires test data, including wind profile, for crosswind component of at least 20 kts or max demonstrated crosswind if available.</p> <p>Airplanes w/reversible flight control systems should also show Wheel Force (±10% or ±1.3daN) and rudder pedal force (±10% or ±2.2 daN)</p> <p>7/23/03 meeting: FAA not concerned by any of these, no SC</p>	<p>UK CAA/FOCA</p> <p>SPECIAL</p> <p>CONDITION</p> <p>Additional Flyout Checklist point</p>

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels B, C,D (3) One engine inop landing	± 3 kts airspeed ± 1.5°pitch ±1.5° angle of attack ± 10% altitude or ± 10feet ±2°bank angle ±2°sideslip angle or yaw angle	Landing	IR	Test from a minimum of 200 feet AGL to nosewheel touchdown.	<p>SAME AS 40B EXCEPT: doesn't call out yaw angle;</p> <p>Calls for test from 200 ft AGL to a 50% decrease in MLG touchdown speed.</p> <p>Requires test data, including wind profile, for crosswind component of at least 20 kts or max demonstrated crosswind if available.</p> <p>Airplanes w/reversible flight control systems should also show Wheel Force (±10% or ±1.3daN) and rudder pedal force (±10% or ±2.2 daN)</p> <p>7/23/03 meeting: FAA not concerned by yaw angle. UKCAA and FOCA will need to consider.</p>	<p>NONE by FAA</p> <p>UK CAA/FOCA SPECIAL CONDITION</p> <p>Accept differences, but should be reviewed during subjective flyout</p> <p>Additional Flyout Checklist point</p>

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
NOT IN 40B					(5) Autoland (if applicable): ± 1.5 m flare height, ± 0.5 seconds T_f , ± 0.7 m/sec (140ft/min) R/D at touchdown ± 3 m/10 ft lateral deviation from max demonstrated crosswind (autoland) deviation; landing flight condition; <i>not a substitute for the ground effects test requirement.</i> Plot lateral deviation from touchdown to autopilot disconnect. T_f = Duration of flare 7/23/03 meeting: UK CAA AND FOCA need to consider for SC; FAA checks subjectively, not objectively	UK CAA/FOCA SPECIAL CONDITION Accept differences, but should be reviewed during subjective flyout Additional Flyout Checklist point

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
NOT IN 40B					<p>(6) Go around: ± 3 kts airspeed, $\pm 1.5^\circ$ pitch, $\pm 1.5^\circ$ angle of attack; go-around configuration. Engine inop go-around required near max landing wt w/critical engine(s) inop. Normal all-engine autopilot go-around should be demonstrated (if applicable) at medium weight CCA: Test in Normal and Non-normal</p> <p>7/23/03 meeting: UK CAA AND FOCA need to consider for SC; FAA checks subjectively, not objectively</p> <p>Additional Flyout (Checklist point 3.8)</p>	<p>UK CAA/FOCA SPECIAL CONDITION</p> <p>Accept differences, but should be reviewed during subjective flyout</p>
Levels B,C,D (4) Directional control (rudder effectiveness) w/reverse thrust, symmetric & asymmetric	± 5 kts airspeed	Landing	IR	Airplane test data required, however, airplane mfr's engineering simulator data may be used for reference data as last resort. Airplanes w/ demonstrated minimum speed for rudder effectiveness ± 5 kts. others, test to verify simulator meets conditions demonstrated by airplane mfr.	<p>SAME AS 40B except says "asymmetric" only</p> <p>7/23/03 meeting: FAA needs to consider for SC.</p> <p>11/18/03: CAA and FOCA take this approach as a matter of practice.</p>	NONE
f. GROUND EFFECT						

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels B,C,D (1) Test to demonstrate longitudinal ground effect	±1° elevator or stabilizer angle ±5% net thrust or equivalent ±1° angle of attack ±10% height/altitude or ±5 ft ±3 kts airspeed ±1° pitch attitude	Landing	IR	See par.4, this appendix. A rationale must be provided with justification of results.	SAME AS 40B	NONE
<i>NOT IN 40B</i>					(g) BRAKE FADE: (1) Test to demonstrate decreased braking efficiency due to brake temperature: no tolerance specified; TO or landing condition; SOC required; test should show decreased efficiency based on airplane related data 7/23/03 meeting: FAA covers through FAA Statement of Compliance Appendix 1, par. 2 no SC	NONE

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
WINDSHEAR (40B Appendix 5)					<p>C, D only: (h) WINDSHEAR: (1) Test to demonstrate windshear models: no tolerance specified; takeoff AND landing condition; windshear models are required which provide training in the specific skills required for recognition of windshear phenomena & execution of recovery.</p> <p>JAR contains an additional note re: models needed for critical phases of flight; may be simplifications ensuring repeatable encounters; ref to FAA or RAE models</p> <p>FAA covers these tests in more detail in 40B Appendix 5, but only for part 121 turbojet aircraft. SC required for both sides.</p>	<p>FAA SPECIAL CONDITION: FAA WILL REQUIRE TESTS IN ACCORDANCE WITH 40B APPENDIX 5 FOR TURBOJET AIRCRAFT OPERATED UNDER PART 121.</p> <p>UK CAA/FOCA SPECIAL CONDITION: ALL LEVEL C AND D SIMULATORS Additional Flyout Checklist point</p>

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
NOT IN 40B					[CCA aircraft only]: ALL LEVELS Flight & maneuver envelope protection fns: (1) Overspeed: Tolerance: ± 5 kts airspeed, cruise flight condition. CCA: Time history results req'd of simulator and response to control inputs during entry into protection envelope limits. Flight test data should be provided for both normal and non-normal control states 7/23/03 meeting: FAA covers through FAA/UK CAA, DGAC, LBA agreement (TGL 5), no SC necessary	UK CAA / FOCA SPECIAL CONDITION: NAA WILL REQUIRE TESTS IN ACCORDANCE WITH JAR-STD 1A Amendment 2
NOT IN 40B					(2) Minimum speed: Tolerance: ± 3 kts airspeed; takeoff, cruise, and approach or landing: 7/23/03 meeting: FAA covers through FAA/UK CAA, DGAC, LBA agreement (TGL 5), no SC necessary CCA: as above	UK CAA / FOCA SPECIAL CONDITION: NAA WILL REQUIRE TESTS IN ACCORDANCE WITH JAR-STD 1A Amendment 2

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TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
NOT IN 40B					(3) Load factor: Tolerance: $\pm 0.1g$ normal acceleration; takeoff and cruise flight conditions; 7/23/03 meeting: FAA covers through FAA/UK CAA, DGAC, LBA agreement (TGL 5), no SC necessary CCA: as above	UK CAA / FOCA SPECIAL CONDITION: NAA WILL REQUIRE TESTS IN ACCORDANCE WITH JAR-STD 1A Amendment 2
NOT IN 40B					(4) Pitch Angle: Tolerance: $\pm 1.5^\circ$ pitch: cruise, go around flight conditions; 7/23/03 meeting: FAA covers through FAA/UK CAA, DGAC, LBA agreement (TGL 5), no SC necessary CCA: as above	UK CAA / FOCA SPECIAL CONDITION: NAA WILL REQUIRE TESTS IN ACCORDANCE WITH JAR-STD 1A Amendment 2
NOT IN 40B					(5) Bank angle: Tolerance: ± 2 degrees or $\pm 10\%$ bank: approach flight condition 7/23/03 meeting: FAA covers through FAA/UK CAA, DGAC, LBA agreement (TGL 5), no SC necessary CCA: as above	UK CAA / FOCA SPECIAL CONDITION: NAA WILL REQUIRE TESTS IN ACCORDANCE WITH JAR-STD 1A Amendment 2

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
NOT IN 40B					(6) Angle of attack: Tolerance: $\pm 1.5^\circ$ angle of attack: second segment and approach or landing flight condition 7/23/03 meeting: FAA covers through FAA/UK CAA, DGAC, LBA agreement (TGL 5), no SC necessary CCA: as above	UK CAA / FOCA SPECIAL CONDITION: NAA WILL REQUIRE TESTS IN ACCORDANCE WITH JAR-STD 1A Amendment 2
3. MOTION SYSTEM						
a) Frequency response	As specified by operator for sim acceptance		IR	Appropriate test to demonstrate frequency response required.	SAME AS 40B	NONE
b) Leg balance	As specified by operator for sim acceptance		IR	Appropriate test to demonstrate leg balance required	SAME AS 40B	NONE
c) Turn around check	As specified by operator for sim acceptance		IR	Appropriate test to demonstrate smooth turn around required.	SAME AS 40B	NONE
Level D: d) Characteristic buffet motions	refers back to general sim reqts in Appx 1 par.3f		IR	Refers back to general sim reqts in Appx 1 par.3f	SAME AS 40B (but repeats the info from the other appendix instead of just referring to it)	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
4. VISUAL SYSTEM						
a) Visual ground segment	±20% Threshold lights must be visible if they are in the visual segment	Landing: static at 100 feet wheel ht above touchdown zone on glide slope. RVR = 1200 ft	IR	ATG should indicate the source of data, i.e., ILS G/S antenna location, pilot eye reference point, cockpit cutoff angle, etc., used to make visual ground segment scene content calculations.	3.3(c) SAME AS 40B 11/18/03: Parties agreed that visual segment tests should be provided for a domestic airport. Additional Flyout (Checklist point 3.7) and Additional Objective testing (Checklist point 5.1)	FAA AND UK CAA AND FOCA SPECIAL CONDITION: VGS TESTS MUST BE PRESENTED FOR FAA AND NAA AIRPORTS TO FAA AND NAA RVR STANDARDS. Additional Flyout, and Calculated VGS in QTG for a relevant runway
Levels C&D: b) Visual system color	Demonstration model		IR		SAME AS 40B	NONE
Levels C&D c) Visual RVR calibration	Demonstration Model		IR		NOT IN JAR. 7/23/03 meeting: UK CAA AND FOCA handles with subjective tests, which is satisfactory to the FAA	NONE
Levels C&D d) Visual Display focus & intensity	Demonstration model		IR		SAME AS 40B	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
Levels C&D e) Visual attitude vs. simulator attitude indicator (pitch and roll of horizon)	Demonstration model		IR		SAME AS 40B	NONE
Levels C&D (f) Demonstrate 10 levels of occulting through each channel of system	Demonstration model		IR	May be requested for recurrent evaluation	SAME AS 40B	NONE
					NOTE: JAR REPEATS THE VISUAL SCENE REQUIREMENTS PREVIOUSLY LAID OUT IN 40B APPX 1 AND JAR STD 1A.030 PAR.2.1; 40B DOES NOT BUT THEY ARE ESSENTIALLY THE SAME (SEE OTHER CHART)	NONE
					NOTE: JAR REPEATS THE SPECIAL EFFECTS REQUIREMENT SECTION FROM ITS PAR. 2.1; SEE OTHER CHART FOR THE COMPARISON.	NONE

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AC 120-40B Appx 2 -- Validation Tests					JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	TOLERANCE	FLT COND	REQ'D FOR:	COMMENTS		
5. SIMULATOR SYSTEMS						
a) Visual, motion, and cockpit instrument response to an abrupt pilot controller input, compared to a/c response for a similar input or Transport delay	Levels C&D: 150 msec or less after airplane response Levels A&B: 300 msec or less after airplane response Levels C&D 150 msec or less after control movement LEVELS A&B: 300 msec or less after control movement	Levels C&D Takeoff, cruise, approach or landing LEVELS A&B: Takeoff, cruise, approach or landing Levels C&D Pitch, roll, yaw Levels A&B Pitch, roll, yaw	IR	One test is required in teach axis (pitch, roll, yaw) for each of the 3 conditions compared to airplane data for a similar input (total 9 tests). Visual change may start before motion response, but motion acceleration must occur before completion of visual scan of first video field containing different information. One test is required in each axis (total 3 tests) See appx 1, item 2.v	SAME AS 40B	NONE

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AC 120-40B Appx 2 -- Validation Tests			JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST	REQ'D FOR	COMMENTS		
<p><i>NOTE: THIS REQ'T RESEMBLES BUT NOT DOES NOT REPEAT VERBATIM THE REQUIREMENTS IN APPX 1 RE: SOUND (par.1k,l,m)``</i></p> <p>Level D: b) Sound Realistic amplitude & frequency of cockpit noises and sounds, including precip static and engine and airframe sounds. Sounds shall be coordinated w/the weather representations required in part 121, appx H, Phase III (Level D), visual reqt no.3</p>	IR	Test results must show a comparison of the amplitude and frequency content of the sounds that originate from the airplane or airplane systems	<p>SAME AS 40B EXCEPT: THIS PAR. ACTUALLY RESEMBLES THE 40B APPX 1 REQUIREMENTS [SEE GENERAL REQTS COMPARISON CHART]</p> <p>7/23/03 meeting: UK CAA AND FOCA/FAA say no problem</p>	NONE
c) Diagnostic testing				
<p>LEVELS C&D: 1) A means for quickly and effectively testing simulator programming and hardware. This could include an automated system which could be used for conducting at least a portion of the tests in the ATG.</p>	IR	<i>NOTE: THIS REPEATS 40B Appendix 1 requirement 1s</i>	Δthis is in JARSTD 1A AMC STD 1A.030 par 2.1, same as 40B appendix 1; but not repeated in this section, unlike 40B 7/23/03 meeting: UK CAA AND FOCA/FAA say no problem	NONE
<p>Level D: 2) Self testing of simulator hardware and programming to determine compliance with levels B,C, and D simulator requirements</p>	IR	<i>NOTE: THIS REPEATS 40B Appendix 1, requirement 1y</i>	Δthis is in JARSTD 1A AMC STD 1A.030 par 2.1, same as 40B appendix 1; but not repeated in this section, unlike 40B 7/23/03 meeting: UK CAA AND FOCA/FAA say no problem	NONE
<p>Level D: 3) Diagnostic analysis as prescribed in part 121 Appx H, Phase III (level D) simulator reqt. no.5</p>	IR	<i>NOTE: THIS REPEATS 40B Appendix 1 requirement 1z</i>	Δthis is in JARSTD 1A AMC STD 1A.030 par 2.1, same as 40B appendix 1; but not repeated in this section, unlike 40B	NONE

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AC 120-40B	JAR-STD 1A, Amt. 2 AMC STD 1A.030, par.3	SPECIAL CONDITION
TEST		
WINDSHEAR		
40B APPENDIX 5 Simulators used to satisfy the requirements of 14 CFR part 121 pertaining to the certificate holder's low-altitude windshear flight training program	JAA AMC STD-1A.030, par. 3.3(2h) requires <i>a</i> test to demonstrate windshear models on all Level C and D simulators; FAA only requires for turbojet aircraft operated under Part 121.	SEE ABOVE REFERENCES AND SPECIAL CONDITIONS FOR WINDSHEAR Additional Flyout Checklist point

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Attachment 3

National Simulator Program, AFS-205 FY-2003 Organizational Structure

(Shaded Areas = Vacant)

